A3250-1F 6/91

U.S. CHEMICAL INDUSTRY STATISTICAL HANDBOOK

CMA
CHEMICAL MANUFACTURERS ASSOCIATION

U.S. Chemical Industry Statistical Handbook

1990

CHEMICAL MANUFACTURERS ASSOCIATION
2501 M Street, NW
Washington, D.C. 20037
202-387-1100
Telex 89617 (CMA WSH)

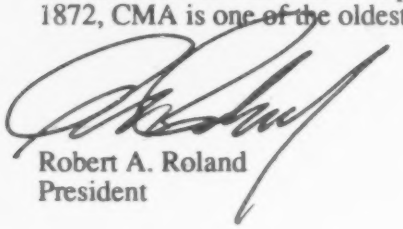
Introduction

November, 1990

This is the initial edition of the Chemical Manufacturers Association's "Chemical Industry Statistical Handbook". The objective of this publication, which will be updated annually, is to provide an economic profile of the U.S. chemical industry and a comprehensive source of economic and other data about the industry.

We anticipate that this initial version of the Handbook will evolve and grow to meet industry and public needs. Suggestions for improvement will be welcomed.

The Chemical Manufacturers Association (CMA) is a nonprofit trade association whose approximately 180 member companies account for more than 90 percent of the basic industrial chemical productive capacity in the United States. Founded in 1872, CMA is one of the oldest nonprofit trade associations in the Western Hemisphere.



Robert A. Roland
President

Table of Contents
U.S. Chemical Industry Statistical Handbook

SECTION		PAGE
	TECHNICAL NOTES AND ACKNOWLEDGEMENTS	2
1	STATISTICAL HIGHLIGHTS	3
2	PRODUCTION, PRICES, AND FINANCIAL	5
	Industrial Production	
	Capacity Utilization	
	GNP by Industry	
	Industry Shipments	
	Value-Added by Manufacture	
	Price Indexes	
	Inventories	
	Income Statement	
	Balance Sheet	
	Financial Ratios	
	Inorganic Chemicals Production	
	Organic Chemicals Production	
	Plastics Resins Production	
	Industrial Gases Production	
	Inorganic Fertilizers Production	
3	INTERNATIONAL TRANSACTIONS	19
	Trade Balance	
	Exports by Product and Country	
	Imports by Product and Country	
4	RESEARCH AND DEVELOPMENT	55
	R&D Funding	
	Patents Granted	
5	INVESTMENT	59
	New Plant and Equipment Expenditures	
	Capital Expenditures	
	Capital Stocks and Capital Productivity	
	Foreign Direct Investment and U.S. Investment Abroad	
6	EMPLOYMENT AND LABOR	67
	Employment	
	Production Employment	
	Average Weekly Hours	
	Average Hourly and Weekly Earnings	
	Labor Productivity and Unit Costs	
7	HEALTH, SAFETY, AND ENVIRONMENTAL	75
	Pollution Abatement Capital Expenditures	
	Pollution Control Gross Annual Costs	
	Indicators of Environmental Progress	
	Incidence of Injury and Illness	
8	ENERGY	91
	Fuel and Power Consumption	
	Electric Power Use	
	Energy Input Prices	
9	STATE CHEMCIAL INDUSTRIES	95
	DEFINITION OF THE CHEMICAL INDUSTRY	98

Technical Notes and Acknowledgements

Unless otherwise noted, all statistical data are drawn from official U.S. government sources

Data sources are noted at the bottom of each table. Lack of space precludes inclusion in this publication of all notes concerning methods and sources which were included in the original statistical sources. For required detail users may find it necessary to consult the original source.

Many time series data go through several revisions. Thus, data for recent years may be preliminary and subject to later revisions.

The abbreviation n/a indicates that data was not available at the time of preparation of the series concerned.

The sum of individual data points within a table may not add to the indicated total due to independent rounding.

Every effort has been made in the preparation of this publication to provide the best available information. However, CMA cannot be responsible for the accuracy of individual statistics.

This publication was prepared by the Trade and Economics Division of the Federal Government Relations Department of CMA. The cooperation of many contacts in government and other organizations is gratefully acknowledged.

Allen J. Lenz (202) 887-1132
Director, Trade and Economics

T. Kevin Swift (202) 887-1286
Senior Economist

Lea S. Williams (202) 887-1165
Staff Assistant

Michelle L. Ray (202) 887-1133
Senior Staff Assistant

Section 1
Statistical Highlights

The U.S. chemical industry makes a wide variety of consumer goods as well as tens of thousands of products that are inputs to the production processes of the construction, manufacturing, service, and agriculture industries. Although one of the oldest U.S. industries, chemicals is a dynamic, high-technology, internationally competitive industry. It is the keystone of U.S. manufacturing, creating new products and processes essential to raising U.S. productivity and living standards.

The U.S. chemical industry produces over 60,000 different products and in 1989 employed 1.1 million people, about 5.6 percent of total manufacturing. Included are some 75,000 scientists, engineers, and technicians who are engaged in research and development (R&D).

About 60 percent of the industry's employees are production workers who earned average wages in 1989 that were 25 percent greater than those for manufacturing as a whole.

The chemical industry produces about 1.7 percent of total U.S. Gross National Product - roughly 9 percent of all U.S. manufacturing. It is the third largest manufacturing sector.

The chemical industry is strong and growing. In 1989, shipments reached $255.6 billion, a record, and a 6.5 percent increase over 1988 levels.

The industry's trade surplus in 1989 was $15.7 billion, a 27 percent increase over 1988. Exports of $36.5 billion constituted a 13 percent increase from the previous year and imports of $20.8 billion, a 4.4 percent increase. The U.S. chemical industry is the second largest (after West Germany) exporter accounting for 13.5% of the estimated $271 billion in total world exports of chemicals.

Record profits of $24.8 billion in 1989 provided the basis for new highs in R&D and capital expenditures for new plant and equipment needed to maintain the industry's international competitiveness.

Investment in new plant and equipment reached $20.4 billion in 1989, a 5.7 percent increase over 1988. Of this, $1.5 billion was spent for pollution abatement and control. In 1989, the industry spent $11.9 billion on R&D, up 11.4 percent from 1988.

The chemical industry's 1989 operating rate was 83.4 percent, down slightly from 83.9 percent in 1988.

TABLE 1.1
SUMMARY OF SELECTED INDICATORS - CHEMICALS & ALLIED PRODUCTS

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Shipments (billion $)	50.1	89.7	147.7	162.5	180.5	170.7	183.2	198.2	197.3	197.1	230.0	240.5	255.6	5.6%	5.2%	6.3%
Production Index (1987=100)	55.9	69.1	91.3	87.8	89.2	81.8	87.5	81.4	91.4	94.6	100.0	105.4	108.5	1.7%	5.9%	2.9%
Corporation Sales (billion $)	n/a	88.2	144.4	163.2	188.8	186.4	201.3	209.6	202.8	205.8	225.2	261.6	279.9	6.8%	6.0%	7.0%
Net Income - After Taxes (billion $)	n/a	6.7	10.9	11.8	13.0	10.3	11.6	13.9	9.5	12.9	16.6	23.7	24.8	8.6%	12.3%	4.7%
Net Income to Sales (%)	n/a	7.6	7.5	7.2	6.9	5.5	5.8	6.6	4.7	6.3	7.4	9.0	8.8	--	--	--
Total Assets (billion $)	n/a	81.1	126.7	148.9	171.5	182.0	187.6	193.1	205.3	217.2	244.4	277.6	295.5	8.8%	8.9%	6.5%
Net Income to Assets (%)	n/a	8.3	8.6	7.9	7.6	5.7	6.2	7.2	4.6	5.9	6.8	8.5	8.4	--	--	--
New Plant & Equipment Expenditures (billion $)	3.38	7.12	9.80	11.63	13.11	12.66	12.96	15.32	16.44	16.74	16.36	19.24	20.35	7.6%	5.8%	5.8%
Operating Rate (%)	77.9	73.4	83.7	78.7	78.3	71.0	75.4	78.0	77.1	78.9	82.0	83.9	83.4	--	--	--
Producer Price Index (1982=100)	35.0	62.0	76.0	89.0	98.4	100.0	100.3	102.9	103.7	102.6	106.4	116.3	123.1	4.9%	3.6%	5.8%
Total Employment (thousands)	1049.3	1014.7	1109.3	1107.4	1109.0	1075.1	1042.8	1049.4	1044.1	1021.8	1025.9	1064.5	1092.9	-0.1%	0.8%	2.7%
Average Weekly Wage - Production Workers ($)	153.52	220.79	318.19	344.43	379.24	407.50	439.96	464.07	484.62	502.17	523.18	536.10	554.09	5.7%	3.6%	3.4%
Funds for Research & Development (billion $)	1.59	2.49	3.69	4.26	5.21	6.20	6.79	7.74	8.31	8.66	9.64	10.57	11.64	12.2%	8.5%	10.2%
Exports (billion $)	3.83	8.69	17.31	20.74	21.19	19.89	19.97	22.83	21.83	22.52	26.02	31.91	36.49	7.7%	9.8%	14.4%
Imports (billion $)	1.45	3.70	7.48	8.59	9.45	9.49	10.96	13.92	14.72	15.30	15.57	20.33	20.75	10.7%	8.3%	2.1%
Trade Surplus (billion $)	2.38	4.99	9.83	12.15	11.74	10.40	9.02	8.91	7.11	7.22	9.46	11.58	15.73	4.8%	12.0%	35.8%

Section 2
Production, Prices, and Financial

The $255.6 billion shipments of the U.S. chemical industry in 1989 includes a wide variety of consumer goods as well as tens of thousands of products that are used extensively in the construction, manufacturing, service, and agricultural industries. Dating from 1635, chemicals is one of the oldest U.S. industries. However, it is also a dynamic, high-technology industry, investing billions of dollars annually in research and development (R&D). The U.S. chemical industry has remained internationally competitive, constantly creating new processes and producing more than 60,000 products that raise U.S. productivity and living standards.

Value-added by the U.S. chemical industry in 1989 was equivalent to roughly 1.7 percent of Gross National Product and about 9 percent of all U.S. manufacturing.

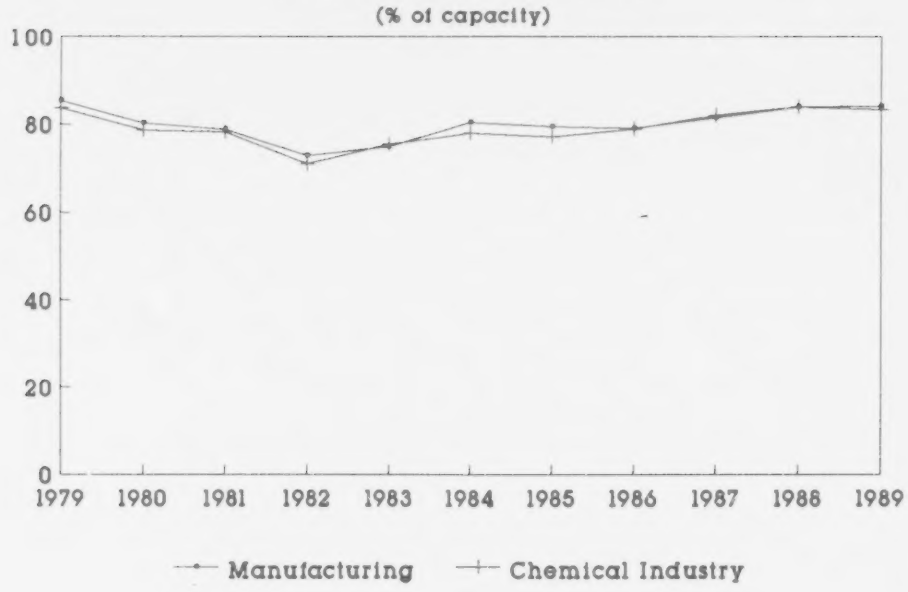
In 1989, the U.S. chemical industry's production volume increased 2.9 percent, a pace equivalent to that for the overall U.S. economy. Despite slightly lower operating rates, record profits in 1989 of $24.8 billion provided the basis for new highs in R&D spending and capital expenditures for new plant and equipment needed to maintain the industry's international competitiveness.

Composition of the industry has been changing, with increasing diversification into high-technology fields, such as pharmaceuticals, biotechnology, and advanced materials that have applications in transportation and other industries. The race to create new products and process technologies necessary to sustain a competitive edge in U.S. and world markets has increased the importance of R&D spending.

Following the recession of the early-1980's, capacity utilization in the chemical industry steadily improved.

Chart 2.1

Capacity Utilization



Following the recession of the early-1980's, chemical industry production expanded by 33 percent.

Chart 2.2
Industrial Production
(1987=100)

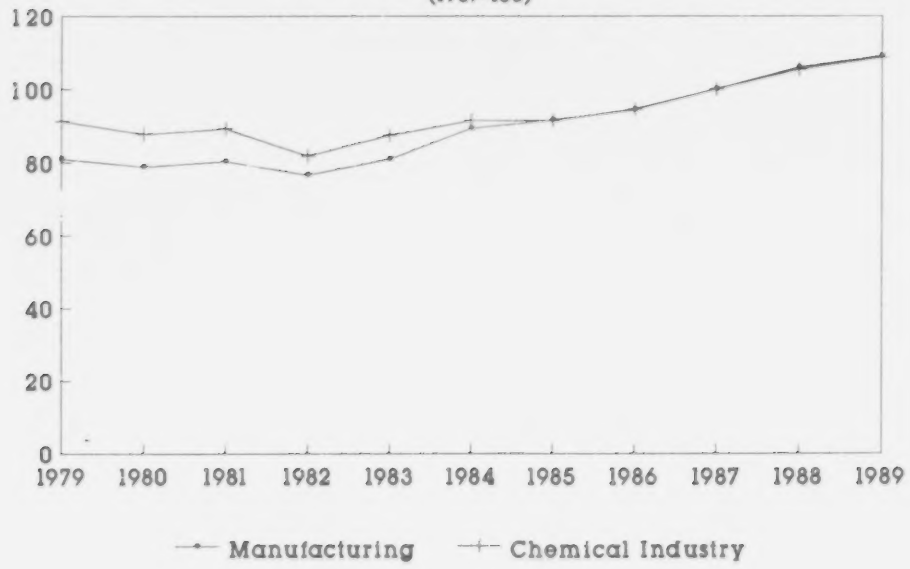


TABLE 2.1
INDUSTRIAL PRODUCTION INDICES (1987=100)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	56.4	61.1	80.9	78.8	80.3	76.6	80.9	89.3	91.6	94.3	100.0	105.8	108.9	3.0%	4.0%	2.9%
Chemicals & Allied Products	55.9	69.1	91.3	87.8	89.2	81.8	87.5	91.4	91.4	94.6	100.0	105.4	108.5	1.7%	3.5%	2.9%
Industrial Inorganic Chemicals	79.4	85.1	101.8	96.5	96.9	86.5	92.1	96.9	96.1	95.1	100.0	98.3	106.6	0.5%	1.9%	8.4%
Alkalies and Chlorine	n/a	100.8	110.7	101.5	94.6	82.1	87.9	95.3	93.6	92.1	100.0	96.0	103.2	-0.7%	1.6%	7.5%
Industrial Gases	n/a	59.3	93.3	91.5	91.2	80.1	85.9	97.5	92.8	98.8	100.0	104.1	108.0	1.5%	2.1%	3.8%
Inorganic Pigments	n/a	97.1	93.3	90.6	90.7	79.1	87.3	89.0	95.1	96.2	100.0	102.6	111.0	1.8%	4.5%	8.2%
Industrial Inorganic Chemicals	96.3	85.9	102.4	96.8	98.7	89.2	94.3	98.0	97.2	94.7	100.0	96.4	105.8	0.3%	1.5%	9.7%
Plastics Materials and Synthetics	39.5	54.8	85.8	71.2	79.5	71.8	84.3	88.9	86.9	91.6	100.0	104.4	103.1	1.9%	3.0%	-1.2%
Plastic Materials and Resins	30.4	41.0	70.4	64.2	68.3	64.4	74.4	81.1	84.1	88.2	100.0	106.8	106.7	4.2%	5.6%	-0.1%
Synthetic Rubber	100.3	95.5	130.0	110.8	114.5	110.5	124.1	132.8	114.4	109.3	100.0	105.0	92.4	-3.4%	-7.0%	-12.0%
Man-Made Fibers	47.5	70.3	104.6	74.9	91.7	76.4	92.3	93.3	86.6	93.7	100.0	99.5	98.7	-0.6%	1.1%	-0.8%
Industrial Organic Chemicals	n/a	69.9	101.8	92.8	97.0	81.0	89.9	93.4	94.1	95.1	100.0	103.1	109.2	0.7%	3.2%	5.9%
Drugs	46.0	62.4	77.1	80.2	80.9	82.7	86.1	86.9	88.5	96.7	100.0	107.2	108.1	3.4%	4.5%	0.9%
Paints and Allied Products	81.5	87.8	92.2	87.0	84.1	78.8	84.6	91.8	95.7	97.5	100.0	103.9	104.8	1.3%	2.7%	0.9%
Agricultural Chemicals	52.9	80.7	93.7	97.2	102.3	88.8	87.5	102.0	96.1	88.5	100.0	107.2	108.2	1.5%	1.2%	0.9%

Source: Federal Reserve Board

TABLE 2.2
CAPACITY UTILIZATION (%)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Manufacturing	79.7	73.2	85.4	80.3	78.8	72.8	74.9	80.4	79.5	79.0	81.4	83.9	84.0
Chemicals & Allied Products	77.9	73.4	83.7	78.7	78.3	71.0	75.4	78.0	77.1	78.9	82.0	83.9	83.4

Source: Federal Reserve Board

TABLE 2.3
VALUE-ADDED TO GNP BY INDUSTRY (BILLION 1982 DOLLARS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	506.8	547.5	697.1	665.4	676.1	634.6	675.5	757.9	786.8	804.6	839.5	880.2	901.4	2.6%	3.5%	2.4%
Chemicals & Allied Products	34.4	39.3	55.4	50.1	53.5	55.3	59.6	60.0	59.1	64.1	68.8	72.9	76.6	3.3%	5.0%	5.1%

Source: Bureau of Economic Analysis
1988 and 1989 are CMA estimates based on BEA and Census Data.

TABLE 2.4
INDUSTRY SHIPMENTS (MILLION DOLLARS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	633440	1039500	1726800	1854200	2017900	1960200	2054800	2253400	2280100	2260300	2390045	2611589	2781576	4.9%	4.3%	6.5%
Chemicals & Allied Products	50122	89721	147674	162517	180459	170737	183206	198233	197311	197091	230022	240476	255598	5.6%	5.2%	6.3%
Industrial Inorganic Chemicals	5554	9661	14786	16546	17945	17280	17758	19898	20260	19491	19766	19045	19414	2.8%	-0.5%	1.9%
Alkalies and Chlorine	660	1633	1211	1354	1543	1571	1667	1872	2042	2011	1548	2489	2524	7.6%	6.2%	1.4%
Industrial Gases	716	985	1465	1540	1858	2019	2112	2364	2416	2402	2618	2355	2304	4.6%	-0.5%	-2.2%
Inorganic Pigments	646	989	1487	1557	1754	1630	1780	1890	2077	2193	2388	2564	2849	6.7%	8.5%	11.1%
Industrial Inorganic Chemicals, nec	3531	6053	10623	12096	12790	12060	12200	13772	13725	12885	13212	11637	11738	1.0%	-3.1%	0.9%
Plastics Materials and Synthetics	9212	14269	26389	27456	30697	28428	32993	35412	33534	35222	40960	45948	49182	6.4%	6.8%	7.0%
Plastics Materials and Resins	4716	7043	14282	14908	16676	15769	18936	20776	20262	21484	26246	31466	33810	9.0%	10.2%	7.4%
Synthetic Rubber	1007	1456	2634	2660	2996	3156	3149	3409	2841	2740	3283	3108	3130	1.7%	-1.7%	0.7%
Cellulosic Man-Made Fibers	621	836	1245	1357	1424	1240	1445	1307	1148	1322	1320	1367	1458	1.6%	2.2%	6.6%
Organic Fibers, Noncellulosic	2869	4934	8227	8530	9602	8263	9463	9920	9284	9677	10112	10007	10785	2.7%	1.7%	7.8%
Drugs	6778	11232	17286	19873	22316	24696	27410	28967	31332	34418	39263	40115	43189	9.6%	8.3%	7.7%
Biological Products	240	663	1196	1424	1545	2300	2817	2669	2713	3086	3819	3603	3753	12.1%	7.1%	4.2%
Medicinals amd Botanicals	545	1182	2352	2809	3267	3398	3371	3410	3283	3153	3350	3464	3627	4.4%	1.2%	4.7%
Pharmaceutical Preparations	5994	9388	13738	15639	17503	18998	21222	22888	25335	28179	32094	33048	35809	10.1%	9.4%	8.4%
Soaps, Cleaners and Toilet Goods	8325	13028	19422	22011	24599	26031	27035	28517	29555	31386	34748	34612	36634	6.6%	5.1%	5.8%
Soap and Other Detergents	2987	4676	6915	8275	9102	9167	9117	9468	10053	10346	11559	11772	12283	5.9%	5.3%	4.3%
Polishes and Sanitation Goods	1510	2492	3726	4130	4747	4614	4717	4902	4541	4928	5594	5445	5853	4.6%	3.6%	7.5%
Surface Active Agents	375	706	1359	1732	2062	2067	2276	2482	2534	2780	3002	3143	3536	10.0%	7.3%	12.5%
Toilet Preparations	3452	5155	7422	7874	8688	10183	10925	11665	12427	13333	14593	14253	14962	7.3%	5.1%	5.0%
Paints and Allied Products	3297	5150	7911	8340	9144	9162	10195	10848	11562	11725	12701	12597	13523	5.5%	4.5%	7.4%
Industrial Organic Chemicals	9806	21057	39354	42839	47152	38157	41264	44208	41786	37266	51535	55644	58952	4.1%	5.9%	5.9%
Gum and Wood Chemicals	262	314	402	481	643	624	604	669	514	493	487	456	462	1.4%	-7.1%	1.2%
Cyclic Crudes and Intermediates	1804	3819	6270	7576	8042	7138	7398	7762	8210	7013	8859	10216	10544	5.3%	6.3%	3.2%
Industrial Organic Chemicals, nec	7740	16923	32683	34782	38467	30394	33262	35777	33062	29760	42189	44972	47947	3.9%	6.0%	6.6%
Agricultural Chemicals	3407	9262	12245	14735	16336	14653	13726	15758	14765	12670	14269	14261	15026	2.1%	-0.9%	5.4%
Nitrogenous Fertilizers	653	2500	2673	3423	3663	3391	2950	3575	3470	2178	2447	3097	3793	3.6%	1.2%	22.5%
Phosphatic Fertilizers	1111	2747	3524	4535	4316	3922	3969	4541	4184	3396	3821	4444	4391	2.2%	-0.7%	-1.2%
Fertilizers, Mixing Only	706	1724	2113	2536	2489	1903	1903	1947	1894	1739	1701	1840	1916	-1.0%	-0.3%	4.2%
Agricultural Chemicals, nec	936	2291	3935	4241	5868	5436	4904	5695	5217	5357	6300	4880	4925	2.3%	-2.9%	0.9%
Miscellaneous Chemical Products	3745	6063	10283	10719	12271	12330	12826	14625	14518	14913	16781	18253	19677	6.7%	6.1%	7.8%
Adhesives and Sealants	702	1405	2340	2354	2708	2858	3119	3488	3672	3838	4678	4798	5091	8.1%	7.9%	6.1%
Explosives	504	613	820	927	995	923	920	1136	1111	1020	1118	1068	1066	2.7%	-1.2%	-0.1%
Printing Ink	400	730	1165	1286	1436	1573	1666	1821	1828	2036	2392	2258	2288	7.0%	4.7%	1.4%
Carbon Black	216	307	547	498	721	633	624	805	715	570	570	534	538	-0.2%	-7.7%	0.7%
Chemical Preparations, nec	1923	3009	5411	5654	6412	6344	6499	7375	7192	7448	8024	9595	10692	7.0%	7.7%	11.4%

Source: Bureau of the Census
Some 1988 and 1989 data are CMA estimates based on Census, ITA, and ITC data.
Data after 1986 are not comparable to 1983-1986 data because of definitional differences.

TABLE 2.5
VALUE-ADDED BY MANUFACTURE (MILLION DOLLARS)*

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	n/a	442485	747481	773831	837507	824118	881988	983228	1000142	1035437	1166555	1274688	1357657	6.1%	6.7%	6.5%
Chemicals & Allied Products	n/a	44976	70356	74384	80032	77315	86473	94728	95257	100013	121239	126749	134719	6.7%	7.3%	6.3%
Industrial Inorganic Chemicals	n/a	5213	7628	8773	9274	8829	9205	10416	11085	10973	11232	10823	11033	3.8%	1.2%	1.9%
Alkalies and Chlorine	362	898	549	584	704	729	765	870	1074	1028	732	1177	1194	8.1%	6.5%	1.4%
Industrial Gases	517	586	828	889	1026	1055	1170	1290	1467	1387	1573	1415	1384	5.3%	1.4%	-2.2%
Inorganic Pigments	337	468	668	709	789	723	758	865	1044	1153	1398	1501	1668	9.6%	14.0%	11.1%
Industrial Inorganic Chemicals, nec	n/a	3261	5584	6591	6755	6321	6512	7392	7501	7405	7530	6632	6689	1.8%	-2.0%	0.9%
Plastic Materials and Synthetics	n/a	5525	10144	9760	10211	9402	12395	13678	12198	14152	17821	19991	21398	7.8%	9.4%	7.0%
Plastics Materials and Resins	n/a	2771	5367	5163	5000	4746	6717	7654	7036	8149	10873	13035	14007	10.1%	12.8%	7.4%
Synthetic Rubber	461	469	885	810	811	909	959	1168	920	1099	1249	1182	1190	3.0%	0.4%	0.7%
Cellulosic Man-Made Fibers	323	303	463	475	505	429	523	489	390	616	637	660	703	4.3%	7.5%	6.6%
Organic Fibers, Noncellulosic	n/a	1983	3429	3313	3894	3318	4197	4367	3851	4287	5062	5010	5399	4.6%	4.3%	7.8%
Drugs	5131	8030	11806	13490	14880	16981	19368	20571	22716	24393	28161	28771	30976	10.1%	8.5%	7.7%
Biological Products	164	429	736	870	978	1442	1834	1656	1651	1940	2496	2355	2453	12.8%	8.2%	4.2%
Medicinals and Botanicals	288	678	1357	1572	1843	2055	2058	1992	1971	1855	1781	1841	1928	3.6%	-0.7%	4.7%
Pharmaceutical Prepaprations	4678	6923	9714	11048	12059	13484	15476	16923	19095	20598	23884	24594	26648	10.6%	9.5%	8.4%
Soaps, Cleaners, and Toilet Goods	n/a	7248	11138	12737	13881	15282	15503	16484	17346	18627	21665	21581	22842	7.4%	6.7%	5.8%
Soaps and Other Detergents	1648	2249	3353	4353	4392	4777	4283	4367	4482	4639	5892	6001	6262	6.4%	7.5%	4.3%
Polishes and Sanitation Goods	n/a	1286	2022	2226	2564	2626	2781	2794	2793	3080	3654	3557	3823	6.6%	6.5%	7.5%
Surface Active Agents	163	270	572	744	952	748	836	1013	1096	1183	1318	1380	1552	10.5%	8.9%	12.5%
Toilet Preparations	2430	3443	5191	5413	5973	7131	7603	8310	8976	9725	10801	10549	11074	7.9%	5.9%	5.0%
Paints and Allied Products	n/a	2126	3364	3559	3867	3953	4706	4932	5169	5407	6221	6170	6623	7.0%	6.1%	7.4%
Industrial Organic Chemicals	5197	9511	16933	15696	16229	12341	14513	15991	14872	14716	21529	23246	24628	3.8%	9.0%	5.9%
Gum and Wood Chemicals	116	130	196	230	291	216	161	256	172	206	213	199	202	0.3%	-4.7%	1.2%
Cyclic Crudes and Intermediates	855	1354	2325	2426	2684	2032	2334	2680	2824	2688	3414	3937	4063	5.7%	8.7%	3.2%
Industrial Organic Chemicals, nec	4225	8027	14412	13039	13254	10094	12017	13055	11876	11822	17902	19083	20345	3.5%	9.3%	6.6%
Agricultural Chemicals	n/a	4546	4646	5699	6218	5097	5108	5911	5128	4708	6338	6334	6674	3.7%	2.5%	5.4%
Nitrogenous Fertilizers	n/a	1582	987	1381	1373	981	913	1307	1086	627	875	1107	1356	3.2%	0.7%	22.5%
Phosphatic Fertilizers	n/a	1179	1068	1502	1078	761	966	1065	771	612	1167	1358	1342	2.3%	4.7%	-1.2%
Fertilizers, Mixing Only	232	545	698	735	589	407	516	487	516	492	464	502	523	-2.8%	1.4%	4.2%
Agricultural Chemicals, nec	n/a	1239	1892	2081	3177	2949	2713	3051	2755	2976	3831	2968	2995	4.7%	-0.4%	0.9%
Miscellaneous Chemical Products	n/a	2777	4699	4671	5474	5433	5675	6745	6744	7038	8273	8999	9701	7.5%	7.5%	7.8%
Adhesives and Sealants	n/a	596	1043	1046	1188	1151	1209	1429	1529	1596	1996	2047	2172	7.6%	8.7%	6.1%
Explosives	276	361	480	574	590	581	613	756	741	668	758	724	724	4.2%	-0.9%	-0.1%
Printing Ink	172	312	438	448	468	558	605	643	664	753	985	930	942	8.0%	7.9%	1.4%
Carbon Black	129	100	187	132	202	191	170	312	289	244	273	256	258	3.3%	-3.8%	0.7%
Chemical Preparations, nec	n/a	1409	2550	2471	3026	2952	3080	3605	3521	3777	4261	5095	5678	8.3%	9.5%	11.4%

* Data after 1986 are not comparable to 1983-1986 data because of definitional differences.

Source: Bureau of the Census

1988 and 1989 data are CMA estimates based on Census, ITA, and ITC data.

Because these data include purchased services, they are do not reflect a true value-added concept.

Unlike the inflationary 1970's, prices for chemicals increased steadily only after 1986.

Chart 2.3
Producer Prices
(1982=100)

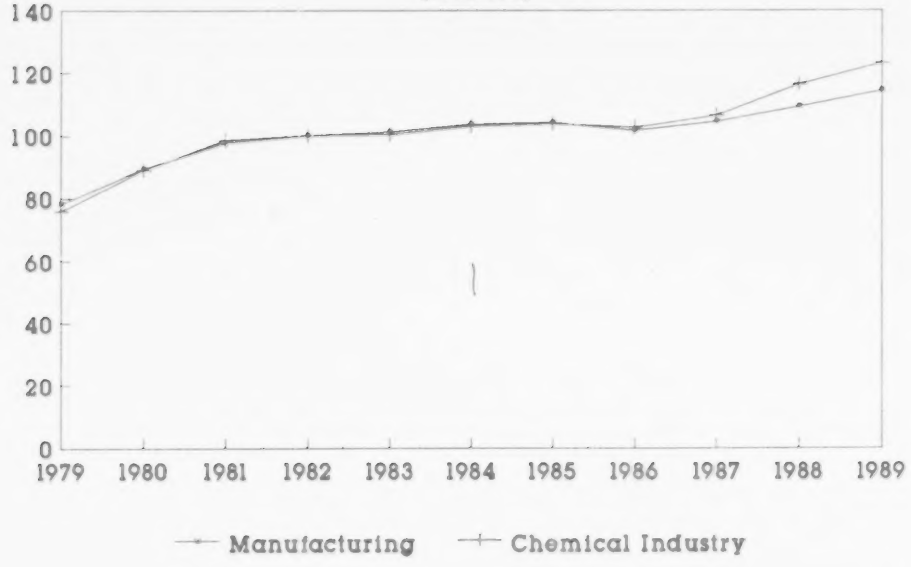


TABLE 2.6
INVENTORIES (MILLION DOLLARS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	101,652	159,932	241,100	264,281	282,645	311,827	312,647	334,767	327,496	316,182	331,132	354,163	371,082	4.4%	2.1%	4.8%
Chemicals & Allied Products	6,693	11,980	17,265	19,621	22,039	23,997	24,521	25,645	25,275	24,400	25,061	27,515	28,918	5.3%	2.4%	5.1%
Industrial Chem., ex. pigments	1,854	3,672	5,395	6,483	7,360	7,987	7,877	8,126	7,610	6,692	6,688	7,330	8,093	4.1%	-0.1%	10.4%
Drugs, Soap, & Toiletries	2.037	3,607	5,463	5,997	6,514	6,867	7,201	7,677	7,898	8,264	8,852	9,543	9,756	6.0%	4.9%	2.2%
Other Chemical Products	1,553	2,457	3,631	3,949	4,461	5,399	5,703	6,020	5,878	5,893	6,092	6,878	7,126	7.0%	3.4%	3.6%

Source: Bureau of the Census

TABLE 2.7
PRODUCER PRICE INDICES (WHERE 1982=100)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	37.7	58.5	78.2	89.3	97.7	100.0	101.0	103.5	104.0	101.7	104.4	109.1	114.3	3.9%	2.0%	4.8%
Chemicals & Allied Products	35.0	62.0	76.0	89.0	98.4	100.0	100.3	102.9	103.7	102.6	106.4	116.3	123.1	4.9%	3.6%	5.8%
Industrial Chemicals	n/a	n/a	74.9	91.9	103.0	100.0	97.3	96.8	96.0	91.5	95.5	106.8	114.8	4.4%	3.5%	7.5%
Plastic Resins & Materials	n/a	n/a	83.2	98.5	102.0	100.0	102.4	108.9	107.5	104.4	110.3	132.4	133.4	4.8%	4.1%	0.8%
Drugs & Pharmaceuticals	n/a	n/a	75.9	83.1	92.1	100.0	107.7	114.2	122.2	129.9	139.1	148.4	160.0	7.7%	7.0%	7.8%
Agricultural Chemicals	n/a	n/a	73.3	87.9	97.5	100.0	96.0	97.4	96.2	94.2	96.4	104.5	108.7	4.0%	2.2%	4.0%
Miscellaneous Chem. Products	n/a	n/a	71.0	83.1	94.1	100.0	101.3	102.7	105.2	105.8	107.0	111.9	117.3	5.1%	2.7%	4.8%

Source: Bureau of Labor Statistics

TABLE 2.8
CHEMICAL INDUSTRY ASSETS (MILLION DOLLARS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1979/89	1984/89	1988/89
Cash & Securities	n/a	5250	5444	5359	6880	7027	8187	9133	9840	11033	11452	12887	12880	9.0%	7.1%	-0.1%
Receivables	n/a	11998	20316	24114	25482	25135	27407	26886	28404	27651	32898	37614	39324	6.8%	7.9%	4.5%
Inventories	n/a	14332	21627	24149	28180	27098	26967	28261	28607	28081	31265	34731	35529	5.1%	4.7%	2.3%
Other Current Assets	n/a	2417	3719	4216	4580	5858	5712	6571	7190	8916	10306	11717	12346	12.7%	13.4%	5.4%
Total Current Assets	n/a	33997	51106	57838	65122	65118	68273	70851	74041	75681	85921	96949	100079	7.0%	7.2%	3.2%
Deprec. & Amortizable Fixed Assets	n/a	57224	85549	99888	109632	122051	128255	133358	137197	138686	149417	160452	172834	7.3%	5.3%	7.7%
Land & Mineral Rights	n/a	2171	3226	4716	5854	7930	7873	6783	6350	6211	6295	9044	9338	11.2%	6.6%	3.3%
Accumulated Deprec. & Amortization	n/a	27622	39693	45816	47963	53169	57851	62860	66381	67350	72946	76660	81234	7.4%	5.3%	6.0%
Net Property,Plant & Equipment	n/a	31773	49082	58788	67523	76813	78277	77281	77166	77547	82766	92835	100939	7.5%	5.5%	8.7%
Other Non-Current Assets	n/a	15343	26531	32270	38866	40073	41022	44957	54132	63938	75759	87798	94490	13.5%	16.0%	7.6%
Total Assets	n/a	81113	126719	148896	171511	182004	187572	193089	205339	217166	244446	277582	295508	8.8%	8.9%	6.5%

Source: Bureau of the Census

TABLE 2.9
CHEMICAL INDUSTRY LIABILITIES (MILLION DOLLARS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1979/89	1984/89	1988/89
Current Liabilities	n/a	14461	26590	31671	34270	36421	40896	44759	50229	50898	60422	67563	74029	10.8%	10.6%	9.6%
Long-Term Debt & Other Liabilities	n/a	20961	32728	37684	47387	50289	49494	48010	54787	65468	77142	89490	94335	11.2%	14.5%	5.4%
Total Liabilities	n/a	35422	59318	69355	81657	86710	90390	92769	105016	116366	137564	157053	168364	11.0%	12.7%	7.2%
Shareholders' Equity	n/a	45691	67403	79541	89855	95294	97182	100321	100323	100801	106882	120530	127143	6.6%	4.9%	5.5%
Total Liab. & Shareholder's Equity	n/a	81113	126721	148896	171511	182004	187572	193089	205339	217166	244446	277582	295508	8.8%	8.9%	6.5%

Source: Bureau of the Census

TABLE 2.10
CHEMICAL INDUSTRY REVENUES AND INCOME (MILLION DOLLARS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1979/89	1984/89	1988/89
Revenues	n/a	88168	144393	163153	188821	186375	201319	209627	202804	205778	225200	261616	279918	6.8%	6.0%	7.0%
Deprec. & Amortization	n/a	3279	5326	5959	7058	7943	8586	8936	9195	10024	9911	11027	11939	8.4%	6.0%	8.3%
Other Operating Costs & Expenses	n/a	74845	125196	143186	165546	166509	178269	183729	180411	180251	195992	225361	242047	6.8%	5.7%	7.4%
Income (or Loss) from Operations	n/a	10044	13871	14008	16215	11924	14465	16960	13199	15503	19297	25229	25930	6.5%	8.9%	2.8%
Nonoperating Income	n/a	774	2479	3070	2722	2150	2236	2860	394	4556	6271	8321	8281	12.8%	23.7%	-0.5%
Income Before Income Taxes	n/a	10818	16350	17078	18937	14074	16702	19820	13592	20059	25566	33551	34212	7.7%	11.5%	2.0%
Income Taxes	n/a	4115	5456	5316	5964	3750	5059	5937	4051	7158	9007	9899	9457	5.7%	9.8%	-4.5%
Income After Taxes	n/a	6703	10894	11762	12973	10324	11643	13883	9541	12901	16559	23652	24755	8.6%	12.3%	4.7%

Source: Bureau of the Census

TABLE 2.11
CHEMICAL INDUSTRY FINANCIAL RATIOS

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Profitability:													
Operating Margin	n/a	11.4%	9.6%	8.6%	8.6%	6.4%	7.2%	8.1%	6.5%	7.5%	8.6%	9.6%	9.3%
Return on Sales	n/a	7.6%	7.5%	7.2%	6.9%	5.5%	5.8%	6.6%	4.7%	6.3%	7.4%	9.0%	8.8%
Return on Assets	n/a	8.3%	8.6%	7.9%	7.6%	5.7%	6.2%	7.2%	4.6%	5.9%	6.8%	8.5%	8.4%
Return on Equity	n/a	14.7%	16.2%	14.8%	14.4%	10.8%	12.0%	13.8%	9.5%	12.8%	15.5%	19.6%	19.5%
Solvency and Liquidity:													
Debt/Equity Ratio	n/a	0.78	0.88	0.87	0.91	0.91	0.93	0.92	1.05	1.15	1.29	1.30	1.32
Current Ratio	n/a	2.35	1.92	1.83	1.90	1.79	1.67	1.58	1.47	1.49	1.42	1.43	1.35
Quick Ratio	n/a	1.36	1.11	1.06	1.08	1.04	1.01	0.95	0.90	0.94	0.90	0.92	0.87
Debt Ratio	n/a	0.44	0.47	0.47	0.48	0.48	0.48	0.48	0.51	0.54	0.56	0.57	0.57
Inventory Turnover	n/a	6.15	6.68	6.76	6.70	6.88	7.47	7.42	7.09	7.33	7.20	7.53	7.88
Working Capital Turnover	n/a	2.59	2.83	2.82	2.90	2.86	2.95	2.96	2.74	2.72	2.62	2.70	2.80
Fixed Asset Turnover	n/a	2.77	2.94	2.78	2.80	2.43	2.57	2.71	2.63	2.65	2.72	2.82	2.77
Total Asset Turnover	n/a	1.09	1.14	1.10	1.10	1.02	1.07	1.09	0.99	0.95	0.92	0.94	0.95

Source: Bureau of the Census, CMA analysis

TABLE 2.12

PRODUCTION OF SELECTED INORGANIC CHEMICALS (THOUSAND TONS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1979/89	1984/89	1988/89
Aluminum Sulfate	1191	1141	1315	1286	1294	1154	1120	1239	1204	1213	1264	1232	1213	-0.8%	-0.4%	-1.5%
Caustic Soda (Sodium Hydroxide)	10141	9635	12759	11606	10621	9385	10039	10914	10790	10405	11486	10527	12030	-0.6%	2.0%	14.3%
Chlorine	9764	9167	12291	11421	10763	9176	9864	10700	10402	10442	11019	11257	11237	-0.9%	1.0%	-0.2%
Hydrochloric Acid	2014	2009	3090	2888	2574	2450	2468	2693	2803	2392	2869	2640	2751	-1.2%	0.4%	4.2%
Hydrogen Peroxide	61	80	114	116	111	108	117	139	144	152	153	177	195	5.5%	7.0%	10.2%
Phosphorous, Elemental	597	450	460	432	426	361	366	386	359	364	344	343	365	-2.3%	-1.1%	6.4%
Sodium Chlorate	198	173	269	313	302	291	310	295	286	267	289	267	285	0.6%	-0.7%	6.7%
Sodium Silicate, Anhydrous	628	724	813	786	771	664	710	685	692	791	952	812	875	0.7%	5.0%	7.8%
Sodium Sulfate	1373	1227	1121	1139	1111	864	914	901	837	841	813	817	780	-3.6%	-2.8%	-4.5%
Sodium Tripolyphosphate	1208	770	758	789	696	651	669	692	612	617	586	549	581	-2.6%	-3.4%	5.8%
Sulfuric Acid	29525	32360	43204	44157	40742	33233	37459	41893	39890	35993	39235	42141	43410	0.0%	0.7%	3.0%
Titanium Dioxide	655	603	742	727	761	660	760	835	864	924	968	1022	1111	4.1%	5.9%	8.7%

Source: Bureau of the Census

TABLE 2.13
PRODUCTION OF SELECTED ORGANIC CHEMICALS (MILLION POUNDS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1979/89	1984/89	1988/89
Acetic Acid	1932	2197	3265	2977	2705	2748	2807	2619	2897	2728	3246	3159	3537	0.8%	6.2%	12.0%
Acetone	1615	1640	2653	2076	2144	1693	1859	1862	1788	1910	1845	2303	2497	-0.6%	6.0%	8.4%
Acrylonitrile	1039	1215	2018	1830	1996	2035	2146	2219	2349	2182	2452	2609	2355	1.6%	1.2%	-9.7%
Aniline	398	407	690	659	634	557	663	786	716	824	859	1029	1026	4.0%	5.5%	-0.3%
Benzene	7675	7019	11797	11227	9573	7700	8435	8530	8251	8860	10589	11627	11658	-0.1%	6.4%	0.3%
Bisphenol A	202	293	576	530	555	480	643	762	949	956	1000	1340	1136	7.0%	8.3%	-15.2%
Butadiene (1,3-)	3101	2597	3583	2799	2986	1915	2353	2827	2340	2546	2931	3169	3094	-1.5%	1.8%	-2.4%
Caprolactum	500	713	945	910	928	793	976	1027	1089	1109	1156	1261	1312	3.3%	5.0%	4.0%
Carbon Tetrachloride	1011	906	714	710	726	587	572	713	646	627	672	761	745	0.4%	0.9%	-2.1%
Chloroform	240	262	356	353	405	299	362	405	275	422	462	524	580	5.0%	7.4%	10.7%
Cumene	1993	2003	3917	3459	3309	2743	3345	3754	2627	3745	4105	4455	4535	1.5%	3.9%	1.8%
Cyclohexane	1841	1734	2425	1964	1820	1275	1656	1994	1657	2070	2276	2297	2389	-0.1%	3.7%	4.0%
Diethylene Glycol	341	323	393	382	364	394	463	535	441	490	436	563	543	3.3%	0.3%	-3.6%
Ethanolamines	264	258	420	376	429	416	468	504	537	543	627	608	632	4.2%	4.6%	3.9%
Ethyl Acetate	161	171	262	234	277	235	213	210	192	199	214	254	286	0.9%	6.4%	12.6%
Ethylbenzene	4827	4822	8448	7642	7813	6656	7876	7562	7386	9020	9346	9929	9223	0.9%	4.1%	-7.1%
Ethylene	18089	20499	29904	28667	29418	24501	28680	31383	29847	32859	34951	37204	34953	1.6%	2.2%	-6.1%
Ethylene Dichloride	7460	7977	11794	11108	9974	7619	11506	10710	12101	12940	12197	13028	13675	1.5%	5.0%	5.0%
Ethylene Glycol	3038	3809	4729	4386	4143	4309	4425	3224	4178	4770	5183	5517	5499	1.5%	11.3%	-0.3%
Ethylene Oxide	3865	4467	5665	5220	4937	4987	5534	5699	5430	5430	4785	5953	5378	-0.5%	-1.2%	-9.7%
Formaldehyde	4427	4558	5971	5555	5721	4817	5465	5815	5606	5549	5733	6280	6374	0.7%	1.9%	1.5%
Isopropyl Alcohol	1919	1521	1900	1836	1669	1380	1209	1394	1235	1301	1371	1389	1367	-3.2%	-0.4%	-1.6%
Maleic Anhydride	215	216	323	304	293	260	299	359	394	359	382	448	440	3.1%	4.2%	-1.8%
Methanol	4932	5176	7367	7153	8577	7556	7982	8186	5003	7205	7537	7345	7139	-0.3%	-2.7%	-2.8%
Methyl Chloride	423	366	463	362	405	366	409	482	415	605	373	428	432	-0.7%	-2.2%	0.9%
Methyl Chloroform	366	459	716	692	614	595	586	675	869	652	694	724	778	0.8%	2.9%	7.5%
Methyl Ethyl Ketone	480	425	656	587	611	468	531	543	537	600	672	482	470	-3.3%	-2.8%	-2.5%
Methyl Methacrylate	445	546	931	780	891	721	844	917	858	943	1029	1100	1162	2.2%	4.8%	5.6%
Methylene Chloride	402	497	633	564	592	532	584	607	467	566	516	504	469	-3.0%	-5.0%	-6.9%
Perchloroethylene	707	679	773	765	691	585	547	573	678	414	473	498	475	-4.8%	-3.7%	-4.6%
Phenol	1708	1746	2981	2568	2578	2175	2638	2889	2841	3115	3841	3562	3893	2.7%	6.1%	9.3%
Phthalic Anhydride	734	702	1013	818	870	684	838	870	820	864	1035	999	1102	0.8%	4.8%	10.3%
Propylene	6641	8709	14198	13675	13482	12535	13959	15559	14887	16522	19019	21224	20027	3.5%	5.2%	-5.6%
Propylene Glycol	428	391	610	488	473	400	484	462	500	573	747	840	843	3.3%	12.8%	0.4%
Styrene	4335	4673	7484	6856	6679	5942	6802	7709	7622	7888	8014	8984	8129	0.8%	1.1%	-9.5%
Terephthalic Acid, Dimethyl	1447	4614	6159	6054	6235	4843	5626	5912	6490	6257	7601	10234	8309	3.0%	7.0%	-18.8%
Toluene	4612	4464	5391	5624	4599	4162	4393	4463	4008	4408	6206	6299	5968	1.0%	6.0%	-5.3%
Vinyl Acetate	803	1290	1982	1921	1936	1876	1963	2024	2112	1710	1813	2561	2470	2.2%	4.1%	-3.6%
Vinyl Chloride	4040	4916	6389	6466	6874	4902	6875	6085	9463	8439	8402	9058	9618	4.2%	9.6%	6.2%
o-Xylene	799	703	1082	995	918	802	781	688	675	788	940	971	842	-2.5%	4.1%	-13.3%
p-Xylene	1590	2484	4650	4238	4532	3391	4114	4264	4779	5035	5155	5601	5494	1.7%	5.2%	-1.9%

Source: United States International Trade Commission

TABLE 2.14
PRODUCTION OF SELECTED PLASTIC RESINS (MILLION POUNDS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1979/89	1984/89	1988/89
Phenolic Resins	1186	1275	1779	1745	1688	1398	1460	1656	1714	1520	1697	1687	1584	-1.2%	-0.9%	-6.1%
Polyamide Resins	108	144	324	315	339	264	348	386	409	477	634	656	495	4.3%	5.1%	-24.5%
Polyethylene and Copolymer	5844	7483	12408	11720	12604	12548	13890	14621	15318	16218	17378	18698	17004	3.2%	3.1%	-9.1%
Polypropylene	1031	1903	3824	3699	4008	3515	4457	5216	5654	5835	6978	7258	6625	5.6%	4.9%	-8.7%
Polystyrene and Copolymers	3550	3877	6327	5540	5915	5609	6254	6857	7229	5794	8284	9186	9018	3.6%	5.6%	-1.8%
Polyvinyl Chloride and Copo	3756	3965	6211	5485	5618	5397	6256	6828	6668	7499	8339	8590	8600	3.3%	4.7%	0.1%

Source: United States International Trade Comission

TABLE 2.15
PRODUCTION OF SELECTED INDUSTRIAL GASES (MILLION CUBIC FEET)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1979/89	1984/89	1988/89
Hydrogen	59654	73552	106456	106562	104817	88131	103354	112790	121243	136478	149217	177008	166788	4.6%	8.1%	-5.8%
Nitrogen	151191	252368	427107	479240	489666	482726	560124	651654	603707	677474	675843	722013	742275	5.7%	2.6%	2.8%
Oxygen	329729	52554	456244	430977	430616	348814	345881	386615	356511	383267	402644	451999	455702	0.0%	3.3%	0.8%

Source: Bureau of the Census

TABLE 2.16
PRODUCTION OF SELECTED INORGANIC FERTILIZERS (THOUSAND TONS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1979/89	1984/89	1988/89
Ammonia, Synthetic Anhydr	13824	16419	18634	19653	19045	15081	13952	16702	17319	14487	16095	16821	16825	-1.0%	0.1%	0.0%
Ammonium Nitrate	6456	7088	8293	9127	8861	7091	6240	7165	7149	6091	6547	7504	7892	-0.5%	2.0%	5.2%
Ammonium Sulfate	1894	2106	2363	2136	2185	1769	1956	2067	2093	2080	2189	2333	2354	0.0%	2.6%	0.9%
Nitric Acid	7603	7527	8916	9232	9093	7390	6968	7798	7645	6736	7225	7991	8016	-1.1%	0.6%	0.3%
Nitrogen Solutions	1721	2068	2321	2773	3099	2786	2605	2894	2656	2275	2385	2902	2913	2.3%	0.1%	0.4%
Phosphoric Acid	5683	7677	10318	10848	9958	8253	9767	11394	10607	9578	10685	11677	11566	1.1%	0.3%	-1.0%

Source: Bureau of the Census

Section 3
International Transactions

The increase in world chemical production has brought with it an even larger increase in international chemical trade. Most chemicals are now manufactured in many production locations around the globe. World exports of chemicals exceeded $270 billion in 1989. World trade in chemicals reflects an intensely competitive struggle for markets by the producers in a "globalized" industry.

The U.S. chemical industry began a limited export trade in potash and naval stores with the United Kingdom as early as the 18th century. In 1989, exports of U.S.-produced chemicals reached $36.5 billion, 13.5% of total world chemical exports. The U.S. chemical industry competes in a global context and has become increasingly dependent for its share of international markets on unique products in which it enjoys a distinct technological advantage. Japan represents the largest single national market for U.S. chemical exports, closely followed by Canada. Western Europe, Latin America, and Asia are other large markets.

U.S. imports of chemicals have also increased, reaching $20.8 billion in 1989. Canada is by far the largest exporter of chemicals to the United States, about $3.9 billion in 1989. The U.S. chemical industry has traditionally maintained trade surpluses, even during the second half of the 1980s, a period when the overall U.S. deficit in merchandise trade was often over $100 billion per year. In 1989, the trade surplus in chemicals reached $15.7 billion, including a $2.3 billion trade surplus with Japan.

The U.S. trade statistics in this section are compiled by the U.S. Department of Commerce and are presented in Standard International Trade Classification Revision 3 format. Exports are domestic, valued free along ship (F.A.S.). Imports are general imports at customs value, which excludes insurance and freight.

Since the mid-1980's, the chemical industry's trade surplus has steadily expanded, reaching a record high in 1989.

Chart 3.1

U.S. Chemicals Trade

1979-1989

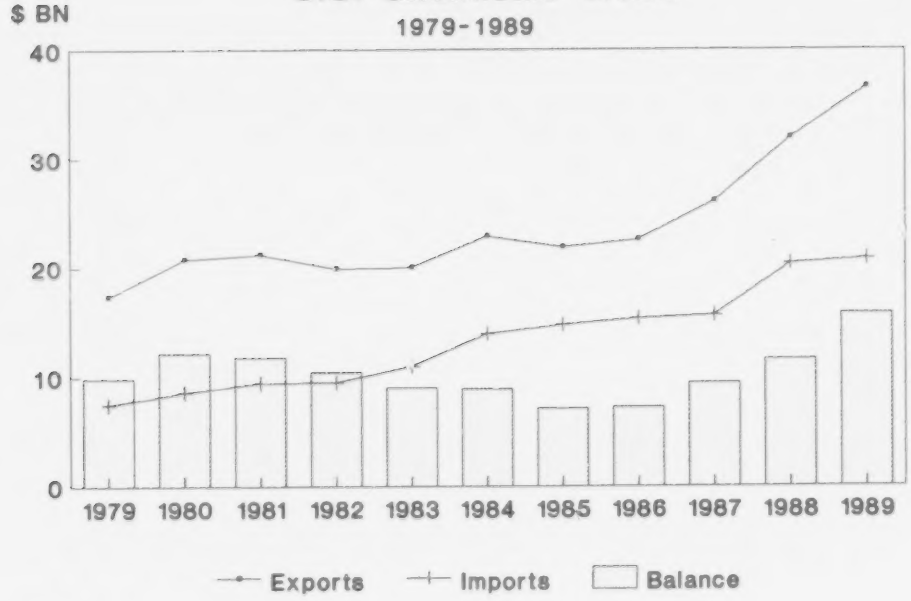


TABLE 3.1
SUMMARY OF CHEMICAL TRADE (MILLION DOLLARS)

Item/Year		1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/84	1989/88
Total Chemicals & Related Products	Exports	19,967	22,830	21,829	22,522	26,023	31,909	36,485	9.8%	2.7%
	Imports	10,945	13,920	14,715	15,302	16,567	20,326	20,752	8.3%	0.4%
	Balance	9,021	8,910	7,113	7,220	9,455	11,583	15,733		
51 Organic Chemicals	Exports	5,349	6,111	5,997	6,423	7,717	9,704	10,609	11.7%	1.8%
	Imports	3,503	4,338	4,765	4,883	5,508	7,250	7,042	10.2%	-0.6%
	Balance	1,846	1,773	1,232	1,539	2,209	2,454	3,567		
52 Inorganic Chemicals	Exports	2,966	3,506	3,625	3,683	3,789	4,289	4,319	4.3%	0.1%
	Imports	2,301	3,111	3,029	2,930	2,668	3,147	3,231	0.8%	0.5%
	Balance	665	395	596	753	1,121	1,142	1,088		
53 Dyeing, tanning and coloring	Exports	715	731	685	767	952	1,100	1,097	8.4%	-0.1%
	Imports	644	803	855	1,069	1,267	1,302	1,133	7.1%	-2.7%
	Balance	71	-72	-170	-303	-314	-202	-37		
54 Medicinal and Pharmaceutical Products	Exports	2,217	2,316	2,418	2,662	2,718	3,262	3,660	9.6%	2.3%
	Imports	812	1,036	1,129	1,231	1,509	1,849	2,086	15.0%	2.4%
	Balance	1,405	1,280	1,288	1,431	1,209	1,413	1,574		
55 Essential Oils and Perfume Materials	Exports	795	813	772	809	951	1,126	1,469	12.6%	5.5%
	Imports	452	629	737	876	982	1,175	1,165	13.1%	-0.2%
	Balance	344	183	35	-67	-31	-50	304		
56 Fertilizers, Manufactured	Exports	1,332	2,203	1,750	929	1,084	1,199	2,821	5.1%	18.7%
	Imports	977	1,115	945	837	768	991	999	-2.2%	0.2%
	Balance	355	1,089	805	92	317	208	1,822		
57 Plastics in primary form	Exports	2,737	2,926	2,730	3,121	4,033	5,503	5,727	14.4%	0.8%
	Imports	541	777	861	1,006	1,113	1,373	1,687	16.8%	4.2%
	Balance	2,197	2,149	1,869	2,114	2,920	4,130	4,040		
58 Plastics in non-primary form	Exports	1,247	1,374	1,272	1,387	1,660	2,001	2,202	9.9%	1.9%
	Imports	754	956	1,009	1,171	1,327	1,574	1,629	11.3%	0.7%
	Balance	493	419	263	216	333	426	572		
59 Chemical Materials & Products	Exports	2,608	2,849	2,581	2,742	3,118	3,725	4,583	10.0%	4.2%
	Imports	962	1,156	1,385	1,298	1,425	1,665	1,780	9.0%	1.3%
	Balance	1,646	1,693	1,196	1,444	1,693	2,060	2,803		

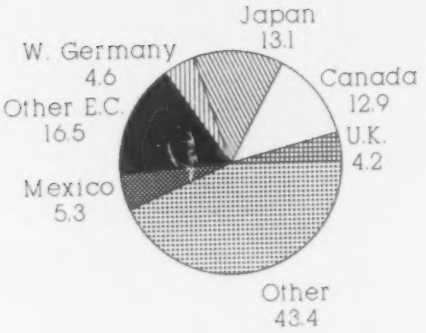
Source: U.S. Department of Commerce

Standard International Trade Code, Revision 3

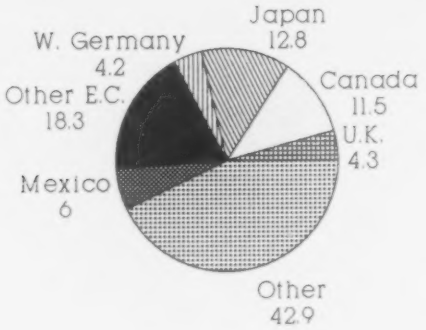
Chart 3.2
EXPORTS
(Percent of Total)

Country of Destination

1983

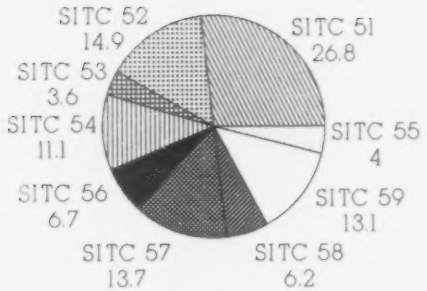


1989



Product Composition

1983



1989

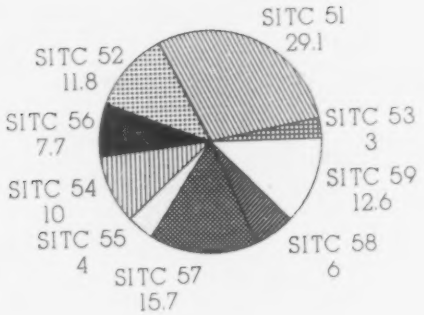
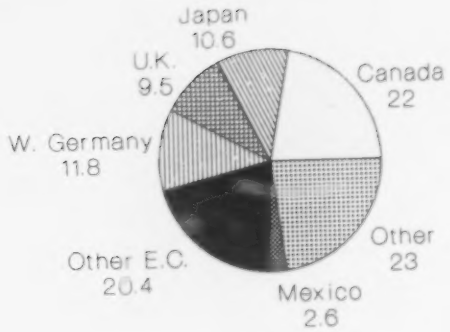


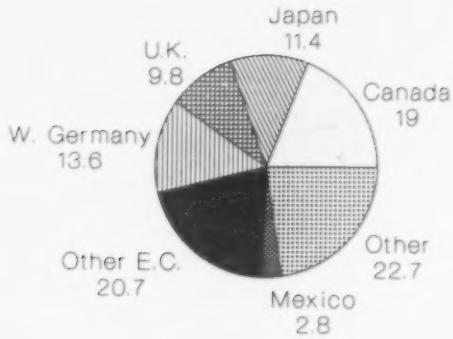
Chart 3.3
IMPORTS
(Percent of Total)

Country of Origin

1983

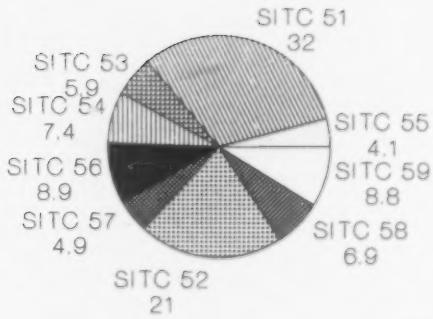


1989



Product Composition

1983



1989

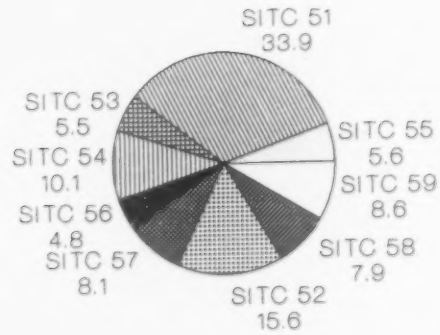


TABLE 3.2
SUMMARY OF CHEMICAL TRADE (PERCENT OF TOTAL)

Item/Year		1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/84	1989/88
51 Organic Chemicals	Exports	26.8%	26.8%	27.5%	28.5%	29.7%	30.4%	29.1%	1.7%	-0.9%
	Imports	32.0%	31.2%	32.4%	31.9%	33.2%	35.7%	33.9%	1.7%	-1.0%
52 Inorganic Chemicals	Exports	14.9%	15.4%	16.6%	16.4%	14.6%	13.4%	11.8%	-5.1%	-2.5%
	Imports	21.0%	22.4%	20.6%	19.1%	16.1%	15.5%	15.6%	-7.0%	0.1%
53 Dyeing, tanning and coloring	Exports	3.6%	3.2%	3.1%	3.4%	3.7%	3.4%	3.0%	-1.3%	-2.7%
	Imports	5.9%	5.8%	5.8%	7.0%	7.6%	6.4%	5.5%	-1.1%	-3.1%
54 Medicinal and Pharmaceutical Products	Exports	11.1%	10.1%	11.1%	11.8%	10.4%	10.2%	10.0%	-0.2%	-0.4%
	Imports	7.4%	7.4%	7.7%	8.0%	9.1%	9.1%	10.1%	6.2%	2.0%
55 Essential Oils and Perfume Materials	Exports	4.0%	3.6%	3.5%	3.6%	3.7%	3.5%	4.0%	2.5%	2.7%
	Imports	4.1%	4.5%	5.0%	5.7%	5.9%	5.8%	5.6%	4.4%	-0.6%
56 Fertilizers, Manufactured	Exports	6.7%	9.7%	8.0%	4.1%	4.2%	3.8%	7.7%	-4.3%	15.5%
	Imports	8.9%	8.0%	6.4%	5.5%	4.6%	4.9%	4.8%	-9.7%	-0.2%
57 Plastics in primary form	Exports	13.7%	12.8%	12.5%	13.9%	15.5%	17.2%	15.7%	4.1%	-1.9%
	Imports	4.9%	5.6%	5.9%	6.6%	6.7%	6.8%	8.1%	7.8%	3.8%
58 Plastics in non-primary form	Exports	6.2%	6.0%	5.8%	6.2%	6.4%	6.3%	6.0%	0.0%	-0.8%
	Imports	6.9%	6.9%	6.9%	7.6%	8.0%	7.7%	7.9%	2.7%	0.3%
59 Chemical Materials & Products	Exports	13.1%	12.5%	11.8%	12.2%	12.0%	11.7%	12.6%	0.1%	1.5%
	Imports	8.8%	8.3%	9.4%	8.5%	8.6%	8.2%	8.6%	0.6%	0.9%
Total Selected Commodities	Exports	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.0%	0.0%
	Imports	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.0%	0.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.3
EXPORTS BY COUNTRY (MILLION DOLLARS)
SITC 5 TOTAL, CHEMICALS AND RELATED PRODUCTS

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	2,576	12.9%	2,857	12.5%	2,714	12.4%	2,613	11.6%	3,221	12.4%	3,751	11.8%	4,210	11.5%
Japan	2,603	13.0%	3,000	13.1%	2,914	13.3%	3,062	13.6%	3,401	13.1%	3,982	12.5%	4,664	12.8%
United Kingdom	842	4.2%	921	4.0%	837	3.8%	910	4.0%	1,087	4.2%	1,367	4.3%	1,554	4.3%
West Germany	916	4.6%	1,078	4.7%	1,056	4.8%	1,177	5.2%	1,177	4.5%	1,369	4.3%	1,515	4.2%
Netherlands	941	4.7%	1,066	4.7%	1,204	5.5%	1,184	5.3%	1,488	5.7%	1,685	5.3%	2,033	5.6%
France	488	2.4%	594	2.6%	665	3.0%	718	3.2%	729	2.8%	833	2.6%	931	2.6%
Italy	354	1.8%	388	1.7%	438	2.0%	482	2.1%	560	2.2%	638	2.0%	731	2.0%
Other E.C.	1,519	7.6%	1,762	7.7%	1,710	7.8%	1,800	8.0%	2,045	7.9%	2,426	7.6%	2,994	8.2%
Total E.C.	5,059	25.3%	5,810	25.4%	5,911	27.1%	6,271	27.8%	7,085	27.2%	8,318	26.1%	9,758	26.7%
Other Developed	1,887	9.5%	1,954	8.6%	1,797	8.2%	1,674	7.4%	1,906	7.3%	2,327	7.3%	2,858	7.8%
Total Developed	12,125	60.7%	13,620	59.7%	13,336	61.1%	13,620	60.5%	15,612	60.0%	18,378	57.6%	21,490	58.9%
Saudi Arabia	273	1.4%	255	1.1%	203	0.9%	180	0.8%	220	0.8%	239	0.7%	213	0.6%
Other OPEC	846	4.2%	1,029	4.5%	869	4.0%	898	4.0%	1,074	4.1%	1,282	4.0%	1,162	3.2%
Total OPEC	1,119	5.6%	1,283	5.6%	1,072	4.9%	1,078	4.8%	1,294	5.0%	1,521	4.8%	1,375	3.8%
Brazil	472	2.4%	546	2.4%	489	2.2%	738	3.3%	655	2.5%	644	2.0%	774	2.1%
Mexico	1,055	5.3%	1,255	5.5%	1,408	6.4%	1,261	5.6%	1,431	5.5%	1,836	5.8%	2,195	6.0%
Other Latin America	2,059	10.3%	2,364	10.4%	2,031	9.3%	2,210	9.8%	2,513	9.7%	2,954	9.3%	2,949	8.1%
Total Latin America	3,585	18.0%	4,164	18.2%	3,927	18.0%	4,209	18.7%	4,599	17.7%	5,433	17.0%	5,918	16.2%
South Korea	524	2.6%	675	3.0%	598	2.7%	749	3.3%	983	3.8%	1,373	4.3%	1,642	4.5%
Singapore	286	1.4%	294	1.3%	253	1.2%	302	1.3%	371	1.4%	481	1.5%	648	1.8%
Taiwan	690	3.5%	694	3.0%	542	2.5%	832	3.7%	1,115	4.3%	1,516	4.8%	1,751	4.8%
Other Asian NICS	271	1.4%	316	1.4%	344	1.6%	389	1.7%	562	2.2%	829	2.6%	692	1.9%
Total Asian NICS	1,771	8.9%	1,979	8.7%	1,737	8.0%	2,273	10.1%	3,031	11.6%	4,199	13.2%	4,733	13.0%
Other Developing Countries	1,073	5.4%	1,406	6.2%	1,371	6.3%	1,096	4.9%	1,121	4.3%	1,582	5.0%	2,031	5.6%
Total Developing Countries	7,110	35.6%	8,188	35.9%	7,569	34.7%	8,081	35.9%	9,306	35.8%	11,881	37.2%	13,450	36.9%
China	353	1.8%	645	2.8%	507	2.3%	422	1.9%	748	2.9%	1,308	4.1%	1,136	3.1%
USSR	305	1.5%	266	1.2%	318	1.5%	294	1.3%	282	1.1%	277	0.9%	332	0.9%
Eastern Europe	67	0.3%	101	0.4%	90	0.4%	94	0.4%	65	0.3%	59	0.2%	77	0.2%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.0%	0	0.0%
Total CPE	724	3.6%	1,012	4.4%	915	4.2%	810	3.6%	1,095	4.2%	1,644	5.2%	1,545	4.2%
World	19,967	100.0%	22,830	100.0%	21,829	100.0%	22,522	100.0%	26,023	100.0%	31,909	100.0%	36,485	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.4
IMPORTS BY COUNTRY (MILLION DOLLARS)
SITC 5 TOTAL, CHEMICALS AND RELATED PRODUCTS

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	2,408	22.0%	3,110	22.3%	2,882	19.6%	2,783	18.2%	3,074	18.6%	3,841	18.9%	3,934	19.0%
Japan	1,155	10.6%	1,408	10.1%	1,526	10.4%	1,922	12.6%	2,301	13.9%	2,399	11.8%	2,373	11.4%
United Kingdom	1,036	9.5%	1,296	9.3%	1,235	8.4%	1,529	10.0%	1,503	9.1%	2,126	10.5%	2,030	9.8%
West Germany	1,295	11.8%	1,646	11.8%	1,559	10.6%	1,907	12.5%	2,236	13.5%	2,674	13.2%	2,828	13.6%
Netherlands	472	4.3%	522	3.8%	682	4.6%	558	3.6%	581	3.5%	726	3.6%	711	3.4%
France	889	8.1%	1,186	8.5%	1,466	10.0%	1,258	8.2%	1,443	8.7%	1,606	7.9%	1,502	7.2%
Italy	323	3.0%	456	3.3%	588	4.0%	517	3.4%	639	3.9%	747	3.7%	722	3.5%
Other E.C.	549	5.0%	765	5.5%	805	5.5%	795	5.2%	931	5.6%	1,187	5.8%	1,365	6.6%
Total E.C.	4,565	41.7%	5,870	42.2%	6,335	43.1%	6,563	42.9%	7,333	44.3%	9,066	44.6%	9,158	44.1%
Other Developed	1,011	9.2%	1,111	8.0%	1,351	9.2%	1,492	9.7%	1,359	8.2%	1,744	8.6%	1,755	8.5%
Total Developed	9,139	83.5%	11,500	82.6%	12,094	82.2%	12,760	83.4%	14,067	84.9%	17,050	83.9%	17,221	83.0%
Saudi Arabia	1	0.0%	1	0.0%	40	0.3%	81	0.5%	56	0.3%	83	0.4%	95	0.5%
Other OPEC	200	1.8%	54	0.4%	63	0.4%	72	0.5%	75	0.5%	93	0.5%	91	0.4%
Total OPEC	201	1.8%	55	0.4%	103	0.7%	153	1.0%	131	0.8%	176	0.9%	187	0.9%
Brazil	241	2.2%	409	2.9%	408	2.8%	274	1.8%	230	1.4%	340	1.7%	315	1.5%
Mexico	287	2.6%	509	3.7%	451	3.1%	330	2.2%	393	2.4%	567	2.8%	582	2.8%
Other Latin America	494	4.5%	413	3.0%	437	3.0%	450	2.9%	441	2.7%	639	3.1%	775	3.7%
Total Latin America	1,022	9.3%	1,330	9.6%	1,297	8.8%	1,054	6.9%	1,064	6.4%	1,546	7.6%	1,671	8.1%
South Korea	58	0.5%	80	0.6%	90	0.6%	135	0.9%	152	0.9%	188	0.9%	185	0.9%
Singapore	8	0.1%	18	0.1%	68	0.5%	123	0.8%	144	0.9%	159	0.8%	176	0.8%
Taiwan	183	1.7%	221	1.6%	238	1.6%	283	1.8%	308	1.9%	336	1.7%	349	1.7%
Other Asian NICS	9	0.1%	17	0.1%	20	0.1%	26	0.2%	29	0.2%	35	0.2%	34	0.2%
Total Asian NICS	257	2.4%	337	2.4%	416	2.8%	567	3.7%	633	3.8%	718	3.5%	744	3.6%
Other Developing Countries	168	1.5%	253	1.8%	290	2.0%	302	2.0%	336	2.0%	438	2.2%	480	2.3%
Total Developing Countries	1,484	13.6%	1,944	14.0%	2,085	14.2%	2,042	13.3%	2,140	12.9%	2,827	13.9%	3,050	14.7%
China	126	1.2%	151	1.1%	157	1.1%	174	1.1%	196	1.2%	230	1.1%	273	1.3%
USSR	144	1.3%	207	1.5%	196	1.3%	163	1.1%	93	0.6%	116	0.6%	108	0.5%
Eastern Europe	53	0.5%	117	0.8%	183	1.2%	163	1.1%	72	0.4%	103	0.5%	100	0.5%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	323	3.0%	475	3.4%	536	3.6%	500	3.3%	361	2.2%	449	2.2%	481	2.3%
World	10,945	100.0%	13,920	100.0%	14,715	100.0%	15,302	100.0%	16,567	100.0%	20,326	100.0%	20,752	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.5
TRADE BALANCE (MILLION DOLLARS)
SITC 5 TOTAL, CHEMICALS AND RELATED PRODUCTS

Item/Year	1983	1984	1985	1986	1987	1988	1989
Canada	168	-254	-168	-170	147	-90	276
Japan	1447	1591	1388	1140	1100	1582	2291
United Kingdom	-195	-375	-398	-618	-416	-759	-476
West Germany	-379	-567	-502	-730	-1059	-1305	-1313
Netherlands	469	544	522	626	907	959	1322
France	-401	-592	-801	-541	-714	-773	-571
Italy	31	-67	-150	-35	-79	-109	8
Other E.C.	970	997	905	1006	1114	1240	1629
Total E.C.	495	-60	-424	-292	-248	-748	599
Other Developed	876	842	446	183	546	583	1103
Total Developed	2986	2120	1242	861	1545	1327	4270
Saudi Arabia	271	253	163	99	164	156	117
Other OPEC	646	975	806	826	999	1189	1071
Total OPEC	918	1228	969	925	1163	1345	1188
Brazil	231	137	80	464	425	304	459
Mexico	767	746	957	931	1038	1269	1613
Other Latin America	1565	1951	1594	1760	2072	2314	2174
Total Latin America	2563	2834	2631	3155	3534	3887	4246
South Korea	465	595	508	615	831	1185	1457
Singapore	279	276	185	179	227	322	472
Taiwan	507	472	304	549	807	1180	1402
Other Asian NICS	262	299	324	363	534	794	658
Total Asian NICS	1514	1642	1321	1706	2399	3481	3989
Other Developing Countries	905	1153	1082	794	785	1144	1551
Total Developing Countries	5626	6244	5484	6038	7166	9054	10400
China	226	494	350	248	552	1078	862
USSR	161	59	122	131	189	161	224
Eastern Europe	14	-16	-93	-69	-6	-44	-23
Other CPE	0	0	0	0	0	1	0
Total CPE	401	536	379	310	735	1195	1063
World	9021	8910	7113	7220	9455	11583	15733

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.6
EXPORTS BY COUNTRY (MILLION DOLLARS)
SITC 51 ORGANIC CHEMICALS

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	604	11.3%	667	10.9%	636	10.6%	642	10.0%	741	9.6%	867	8.9%	941	8.9%
Japan	653	12.2%	704	11.5%	690	11.5%	743	11.6%	899	11.7%	1,120	11.5%	1,175	11.1%
United Kingdom	248	4.6%	259	4.2%	244	4.1%	251	3.9%	256	3.3%	391	4.0%	372	3.5%
West Germany	138	2.6%	180	2.9%	195	3.2%	206	3.2%	247	3.2%	344	3.5%	379	3.6%
Netherlands	473	8.8%	491	8.0%	569	9.5%	522	8.1%	762	9.9%	769	7.9%	955	9.0%
France	84	1.6%	93	1.5%	90	1.5%	82	1.3%	96	1.2%	130	1.3%	131	1.2%
Italy	109	2.0%	104	1.7%	150	2.5%	153	2.4%	177	2.3%	165	1.7%	175	1.7%
Other E.C.	43	0.8%	50	0.8%	50	0.8%	56	0.9%	665	8.6%	820	8.4%	1,023	9.6%
Total E.C.	1,476	27.6%	1,629	26.7%	1,745	29.1%	1,773	27.6%	2,202	28.5%	2,619	27.0%	3,036	28.6%
Other Developed	496	9.3%	555	9.1%	470	7.8%	420	6.5%	519	6.7%	674	6.9%	833	7.8%
Total Developed	3,229	60.4%	3,555	58.2%	3,541	59.1%	3,578	55.7%	4,362	56.5%	5,280	54.4%	5,984	56.4%
Saudi Arabia	9	0.2%	18	0.3%	21	0.3%	26	0.4%	31	0.4%	37	0.4%	30	0.3%
Other OPEC	187	3.5%	258	4.2%	229	3.8%	236	3.7%	288	3.7%	341	3.5%	251	2.4%
Total OPEC	196	3.7%	276	4.5%	250	4.2%	262	4.1%	320	4.1%	378	3.9%	281	2.6%
Brazil	168	3.1%	197	3.2%	197	3.3%	303	4.7%	279	3.6%	257	2.7%	285	2.7%
Mexico	420	7.9%	544	8.9%	604	10.1%	476	7.4%	523	6.8%	665	6.9%	680	6.4%
Other Latin America	539	10.1%	655	10.7%	523	8.7%	618	9.6%	673	8.7%	789	8.1%	692	6.5%
Total Latin America	1,127	21.1%	1,396	22.8%	1,323	22.1%	1,396	21.7%	1,475	19.1%	1,712	17.6%	1,657	15.6%
South Korea	259	4.8%	325	5.3%	290	4.8%	383	6.0%	472	6.1%	718	7.4%	793	7.5%
Singapore	64	1.2%	75	1.2%	76	1.3%	97	1.5%	106	1.4%	165	1.7%	198	1.9%
Taiwan	275	5.1%	248	4.1%	287	4.8%	475	7.4%	669	8.7%	942	9.7%	1,051	9.9%
Other Asian NICS	73	1.4%	67	1.1%	63	1.1%	57	0.9%	101	1.3%	134	1.4%	107	1.0%
Total Asian NICS	671	12.6%	716	11.7%	717	12.0%	1,011	15.7%	1,348	17.5%	1,960	20.2%	2,149	20.3%
Other Developing Countries	219	4.1%	255	4.2%	224	3.7%	253	3.9%	281	3.6%	350	3.6%	392	3.7%
Total Developing Countries	2,080	38.9%	2,445	40.0%	2,352	39.2%	2,741	42.7%	3,185	41.3%	4,121	42.5%	4,318	40.7%
China	33	0.6%	98	1.6%	89	1.5%	81	1.3%	153	2.0%	280	2.9%	286	2.7%
USSR	0	0.0%	4	0.1%	2	0.0%	9	0.1%	6	0.1%	10	0.1%	6	0.1%
Eastern Europe	7	0.1%	9	0.1%	12	0.2%	15	0.2%	11	0.1%	13	0.1%	15	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	40	0.8%	111	1.8%	103	1.7%	104	1.6%	170	2.2%	303	3.1%	307	2.9%
Total World	5,349	100.0%	6,111	100.0%	5,997	100.0%	6,423	100.0%	7,717	100.0%	9,704	100.0%	10,609	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.7
IMPORTS BY COUNTRY (MILLION DOLLARS)
SITC 51 ORGANIC CHEMICALS

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	546	15.6%	575	13.2%	585	12.3%	463	9.5%	529	9.6%	803	11.1%	604	8.6%
Japan	404	11.5%	480	11.1%	524	11.0%	681	13.9%	814	14.8%	859	11.8%	926	13.1%
United Kingdom	488	13.9%	578	13.3%	572	12.0%	640	13.1%	704	12.8%	914	12.6%	882	12.5%
West Germany	466	13.3%	594	13.7%	585	12.3%	655	13.4%	752	13.7%	1,067	14.7%	1,070	15.2%
Netherlands	288	8.2%	331	7.6%	383	8.0%	279	5.7%	316	5.7%	421	5.8%	361	5.1%
France	220	6.3%	279	6.4%	309	6.5%	282	5.8%	367	6.7%	438	6.0%	399	5.7%
Italy	148	4.2%	203	4.7%	287	6.0%	213	4.4%	258	4.7%	320	4.4%	331	4.7%
Other E.C.	233	6.7%	334	7.7%	331	6.9%	352	7.2%	382	6.9%	530	7.3%	560	7.9%
Total E.C.	1,843	52.6%	2,320	53.5%	2,467	51.8%	2,420	49.6%	2,779	50.4%	3,690	50.9%	3,603	51.2%
Other Developed	238	6.8%	281	6.5%	359	7.5%	372	7.6%	455	8.3%	656	9.1%	549	7.8%
Total Developed	3,031	86.5%	3,655	84.3%	3,935	82.6%	3,936	80.6%	4,577	83.1%	6,008	82.9%	5,683	80.7%
Saudi Arabia	1	0.0%	1	0.0%	37	0.8%	66	1.4%	50	0.9%	69	1.0%	79	1.1%
Other OPEC	3	0.1%	4	0.1%	14	0.3%	15	0.3%	16	0.3%	15	0.2%	10	0.1%
Total OPEC	4	0.1%	5	0.1%	51	1.1%	81	1.7%	65	1.2%	84	1.2%	90	1.3%
Brazil	178	5.1%	286	6.6%	223	4.7%	169	3.5%	137	2.5%	188	2.6%	134	1.9%
Mexico	37	1.1%	73	1.7%	51	1.1%	49	1.0%	65	1.2%	127	1.8%	158	2.2%
Other Latin America	121	3.4%	122	2.8%	207	4.4%	232	4.7%	227	4.1%	319	4.4%	438	6.2%
Total Latin America	336	9.6%	480	11.1%	481	10.1%	450	9.2%	428	7.8%	634	8.7%	730	10.4%
South Korea	34	1.0%	39	0.9%	43	0.9%	61	1.2%	67	1.2%	77	1.1%	71	1.0%
Singapore	4	0.1%	8	0.2%	61	1.3%	113	2.3%	129	2.3%	134	1.9%	157	2.2%
Taiwan	15	0.4%	21	0.5%	30	0.6%	34	0.7%	34	0.6%	48	0.7%	38	0.5%
Other Asian NICS	1	0.0%	2	0.0%	2	0.0%	3	0.1%	3	0.1%	8	0.1%	6	0.1%
Total Asian NICS	54	1.5%	70	1.6%	136	2.9%	212	4.3%	232	4.2%	267	3.7%	272	3.9%
Other Developing Countries	33	0.9%	53	1.2%	81	1.7%	115	2.4%	122	2.2%	170	2.4%	182	2.6%
Total Developing Countries	426	12.2%	608	14.0%	745	15.6%	852	17.5%	844	15.3%	1,151	15.9%	1,269	18.0%
China	33	0.9%	42	1.0%	32	0.7%	43	0.9%	43	0.8%	51	0.7%	60	0.9%
USSR	2	0.1%	12	0.3%	20	0.4%	19	0.4%	17	0.3%	15	0.2%	15	0.2%
Eastern Europe	10	0.3%	21	0.5%	33	0.7%	33	0.7%	27	0.5%	26	0.4%	15	0.2%
Total CPE	45	1.3%	75	1.7%	84	1.8%	95	1.9%	87	1.6%	92	1.3%	91	1.3%
World	3,503	100.0%	4,338	100.0%	4,765	100.0%	4,883	100.0%	5,508	100.0%	7,250	100.0%	7,042	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.8
TRADE BALANCE (MILLION DOLLARS)
SITC 51 ORGANIC CHEMICALS

Item/Year	1983	1984	1985	1986	1987	1988	1989
Canada	58	92	51	178	212	64	337
Japan	249	224	166	62	85	261	249
United Kingdom	-240	-320	-328	-389	-448	-523	-510
West Germany	-328	-415	-390	-449	-506	-723	-691
Netherlands	185	160	186	243	446	348	594
France	-136	-186	-220	-199	-271	-308	-268
Italy	-39	-99	-137	-60	-81	-155	-156
Other E.C.	192	169	167	208	284	290	464
Total E.C.	-367	-691	-721	-647	-576	-1071	-568
Other Developed	258	275	111	48	64	18	283
Total Developed	197	-100	-394	-358	-215	-728	301
Saudi Arabia	8	17	-16	-40	-18	-32	-50
Other OPEC	184	254	215	221	272	326	241
Total OPEC	192	271	199	181	254	294	191
Brazil	-10	-89	-26	134	143	70	151
Mexico	383	471	553	426	458	538	522
Other Latin America	418	533	315	386	446	471	254
Total Latin America	791	916	842	946	1047	1078	927
South Korea	225	286	247	323	405	641	722
Singapore	61	67	16	-17	-23	31	42
Taiwan	259	227	257	441	635	895	1012
Other Asian NICS	73	65	61	53	98	126	101
Total NICS	618	646	580	800	1115	1693	1877
Other Developing Countries	186	202	144	138	159	180	209
Total Developing Countries	1653	1837	1606	1889	2341	2970	3050
China	1	56	58	38	110	229	226
USSR	-2	-8	-18	-10	-12	-5	-9
Eastern Europe	-4	-12	-21	-19	-16	-13	0
Other CPE	0	0	0	0	0	0	0
Total CPE	-5	36	19	9	83	212	216
World	1846	1773	1232	1539	2209	2454	3567

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.9
EXPORTS BY COUNTRY (MILLION DOLLARS)
SITC 52 INORGANIC CHEMICALS

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	297	10.0%	312	8.9%	329	9.1%	345	9.4%	387	10.2%	484	11.3%	483	11.2%
Japan	632	21.3%	834	23.8%	820	22.6%	909	24.7%	872	23.0%	936	21.8%	1,130	26.2%
United Kingdom	84	2.8%	114	3.2%	71	2.0%	89	2.4%	168	4.4%	149	3.5%	203	4.7%
West Germany	370	12.5%	417	11.9%	344	9.5%	341	9.2%	270	7.1%	244	5.7%	257	6.0%
Netherlands	63	2.1%	95	2.7%	162	4.5%	153	4.2%	163	4.3%	168	3.9%	177	4.1%
France	31	1.0%	138	3.9%	207	5.7%	243	6.6%	159	4.2%	129	3.0%	95	2.2%
Italy	16	0.5%	18	0.5%	29	0.8%	38	1.0%	54	1.4%	50	1.2%	43	1.0%
Other E.C.	89	3.0%	202	5.8%	217	6.0%	131	3.5%	175	4.6%	167	3.9%	164	3.8%
Total E.C.	653	22.0%	984	28.1%	1,030	28.4%	995	27.0%	989	26.1%	906	21.1%	939	21.7%
Other Developed	395	13.3%	283	8.1%	356	9.8%	246	6.7%	222	5.9%	309	7.2%	305	7.1%
Total Developed	1,977	66.7%	2,412	68.8%	2,534	69.9%	2,496	67.8%	2,470	65.2%	2,636	61.4%	2,857	66.2%
Saudi Arabia	15	0.5%	17	0.5%	9	0.3%	8	0.2%	10	0.3%	16	0.4%	7	0.2%
Other OPEC	100	3.4%	136	3.9%	101	2.8%	101	2.7%	139	3.7%	181	4.2%	151	3.5%
Total OPEC	115	3.9%	154	4.4%	110	3.0%	109	3.0%	148	3.9%	196	4.6%	158	3.7%
Brazil	54	1.8%	74	2.1%	72	2.0%	114	3.1%	109	2.9%	100	2.3%	109	2.5%
Mexico	114	3.8%	115	3.3%	136	3.8%	127	3.4%	168	4.4%	182	4.2%	205	4.8%
Other Latin America	208	7.0%	249	7.1%	237	6.5%	262	7.1%	316	8.3%	436	10.2%	372	8.6%
Total Latin America	376	12.7%	439	12.5%	446	12.3%	502	13.6%	593	15.7%	718	16.7%	686	15.9%
South Korea	58	2.0%	83	2.4%	79	2.2%	83	2.2%	123	3.3%	171	4.0%	195	4.5%
Singapore	11	0.4%	10	0.3%	9	0.3%	12	0.3%	15	0.4%	18	0.4%	25	0.6%
Taiwan	157	5.3%	124	3.5%	64	1.8%	97	2.6%	59	1.6%	80	1.9%	166	3.9%
Other Asian NICS	13	0.5%	30	0.9%	64	1.8%	61	1.7%	52	1.4%	35	0.8%	55	1.3%
Total Asian NICS	240	8.1%	246	7.0%	217	6.0%	253	6.9%	250	6.6%	304	7.1%	442	10.2%
Other Developing Countries	119	4.0%	181	5.2%	234	6.5%	215	5.8%	172	4.5%	280	6.5%	172	4.0%
Total Developing Countries	788	26.6%	925	26.4%	926	25.5%	1,011	27.4%	1,061	28.0%	1,371	32.0%	1,357	31.4%
China	20	0.7%	19	0.5%	18	0.5%	66	1.8%	155	4.1%	188	4.4%	82	1.9%
USSR	169	5.7%	143	4.1%	132	3.6%	86	2.3%	87	2.3%	80	1.9%	15	0.4%
Eastern Europe	12	0.4%	7	0.2%	15	0.4%	25	0.7%	17	0.5%	15	0.3%	7	0.2%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	201	6.8%	169	4.8%	165	4.6%	177	4.8%	259	6.8%	282	6.6%	105	2.4%
Total World	2,966	100.0%	3,506	100.0%	3,625	100.0%	3,683	100.0%	3,789	100.0%	4,289	100.0%	4,319	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.10
IMPORTS BY COUNTRY (MILLION DOLLARS)
SITC 52 INORGANIC CHEMICALS

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	686	29.8%	1,124	36.1%	968	31.9%	978	33.4%	1,065	39.9%	1,117	35.5%	1,251	38.7%
Japan	106	4.6%	107	3.4%	110	3.6%	110	3.8%	157	5.9%	151	4.8%	164	5.1%
United Kingdom	174	7.5%	203	6.5%	127	4.2%	276	9.4%	113	4.2%	314	10.0%	223	6.9%
West Germany	176	7.7%	271	8.7%	169	5.6%	256	8.7%	243	9.1%	259	8.2%	326	10.1%
Netherlands	32	1.4%	20	0.6%	66	2.2%	32	1.1%	33	1.2%	44	1.4%	53	1.6%
France	298	12.9%	416	13.4%	636	21.0%	378	12.9%	418	15.7%	376	11.9%	254	7.9%
Italy	13	0.6%	16	0.5%	43	1.4%	40	1.4%	40	1.5%	46	1.5%	40	1.2%
Other E.C.	42	1.8%	54	1.7%	86	2.9%	55	1.9%	50	1.9%	72	2.3%	68	2.1%
Total E.C.	734	31.9%	980	31.5%	1,127	37.2%	1,039	35.5%	897	33.6%	1,111	35.3%	964	29.8%
Other Developed	352	15.3%	324	10.4%	357	11.8%	420	14.3%	167	6.2%	235	7.5%	190	5.9%
Total Developed	1,879	81.6%	2,535	81.5%	2,561	84.6%	2,547	86.9%	2,286	85.7%	2,613	83.0%	2,569	79.5%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2	0.1%	7	0.2%	11	0.3%
Other OPEC	7	0.3%	16	0.5%	11	0.4%	4	0.1%	2	0.1%	4	0.1%	16	0.5%
Total OPEC	7	0.3%	16	0.5%	11	0.4%	4	0.1%	4	0.2%	10	0.3%	27	0.8%
Brazil	11	0.5%	26	0.8%	27	0.9%	24	0.8%	19	0.7%	30	1.0%	59	1.8%
Mexico	166	7.2%	173	5.5%	134	4.4%	124	4.2%	137	5.1%	193	6.1%	204	6.3%
Other Latin America	98	4.3%	161	5.2%	98	3.2%	67	2.3%	74	2.8%	115	3.6%	162	5.0%
Total Latin America	275	11.9%	360	11.6%	259	8.6%	215	7.3%	230	8.6%	338	10.7%	425	13.2%
South Korea	5	0.2%	6	0.2%	3	0.1%	3	0.1%	3	0.1%	5	0.2%	6	0.2%
Singapore	0	0.0%	0	0.0%	0	0.0%	1	0.0%	0	0.0%	0	0.0%	0	0.0%
Taiwan	5	0.2%	6	0.2%	6	0.2%	8	0.3%	8	0.3%	10	0.3%	10	0.3%
Other Asian NICS	0	0.0%	1	0.0%	3	0.1%	3	0.1%	3	0.1%	5	0.1%	7	0.2%
Total Asian NICS	10	0.4%	14	0.5%	12	0.4%	15	0.5%	14	0.5%	20	0.6%	23	0.7%
Other Developing Countries	19	0.8%	22	0.7%	30	1.0%	31	1.0%	27	1.0%	30	0.9%	47	1.4%
Total Developing Countries	305	13.2%	399	12.8%	306	10.1%	261	8.9%	273	10.2%	394	12.5%	517	16.0%
China	15	0.6%	31	1.0%	38	1.3%	33	1.1%	39	1.5%	53	1.7%	57	1.8%
USSR	98	4.3%	142	4.6%	119	3.9%	84	2.9%	64	2.4%	77	2.4%	83	2.6%
Eastern Europe	5	0.2%	4	0.1%	4	0.1%	5	0.2%	6	0.2%	10	0.3%	4	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	118	5.1%	177	5.7%	161	5.3%	122	4.2%	109	4.1%	140	4.4%	145	4.5%
World	2,301	100.0%	3,111	100.0%	3,029	100.0%	2,930	100.0%	2,668	100.0%	3,147	100.0%	3,231	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.11
TRADE BALANCE (MILLION DOLLARS)
SITC 52 INORGANIC CHEMICALS

Item/Year	1983	1984	1985	1986	1987	1988	1989
Canada	-389	-812	-639	-633	-678	-633	-768
Japan	526	727	709	799	714	786	966
United Kingdom	-89	-90	-56	-187	55	-165	-19
West Germany	194	146	175	84	27	-15	-69
Netherlands	31	75	96	121	131	125	124
France	-267	-277	-429	-136	-259	-247	-159
Italy	3	2	-14	-2	14	4	3
Other E.C.	47	147	131	75	125	94	96
Total E.C.	-81	3	-97	-44	92	-205	-25
Other Developed	42	-41	-1	-173	56	75	115
Total Developed	98	-123	-27	-51	184	22	288
Saudi Arabia	15	17	9	8	8	9	-4
Other OPEC	94	120	90	98	136	177	135
Total OPEC	108	137	99	106	144	186	131
Brazil	44	48	45	90	90	70	50
Mexico	-52	-57	2	2	31	-11	1
Other Latin America	110	88	139	195	242	322	210
Total Latin America	102	79	186	287	363	380	261
South Korea	53	77	76	80	121	166	189
Singapore	11	9	9	11	15	18	25
Taiwan	152	118	58	89	51	70	156
Other Asian NICS	13	29	61	58	49	31	48
Total Asian NICS	230	232	205	238	236	285	419
Other Developing Countries	100	159	204	184	145	251	125
Total Developing Countries	483	526	620	750	787	977	840
China	5	-11	-20	33	116	134	25
USSR	71	1	13	2	23	3	-68
Eastern Europe	7	3	11	19	11	5	3
Other CPE	0	0	0	0	0	0	0
Total CPE	83	-8	4	55	150	143	-40
World	665	395	596	753	1121	1142	1088

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.12
EXPORTS BY COUNTRY (MILLION DOLLARS)
SITC 53 DYEING, TANNING AND COLORING MATERIALS

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	164	22.9%	179	24.5%	172	25.1%	156	20.4%	223	23.4%	227	20.6%	230	20.9%
Japan	51	7.1%	56	7.6%	62	9.0%	68	8.9%	76	8.0%	95	8.6%	93	8.5%
United Kingdom	40	5.6%	35	4.8%	29	4.3%	34	4.4%	43	4.5%	58	5.2%	70	6.3%
West Germany	26	3.6%	27	3.7%	27	4.0%	29	3.8%	44	4.6%	44	4.0%	37	3.4%
Netherlands	35	5.0%	37	5.0%	35	5.1%	45	5.8%	47	5.0%	60	5.4%	44	4.0%
France	16	2.2%	13	1.8%	12	1.8%	19	2.5%	24	2.5%	23	2.1%	16	1.5%
Italy	11	1.5%	10	1.3%	8	1.2%	9	1.2%	13	1.4%	14	1.2%	13	1.2%
Other E.C.	41	5.7%	34	4.7%	31	4.5%	47	6.2%	53	5.6%	80	7.3%	81	7.4%
Total E.C.	168	23.5%	155	21.3%	143	20.8%	183	23.9%	224	23.6%	278	25.3%	261	23.8%
Other Developed	48	6.7%	51	7.0%	47	6.9%	55	7.2%	56	5.9%	70	6.3%	73	6.7%
Total Developed	431	60.3%	441	60.3%	424	61.9%	463	60.3%	580	60.9%	670	60.8%	657	59.9%
Saudi Arabia	30	4.2%	19	2.6%	12	1.7%	11	1.5%	13	1.4%	14	1.2%	14	1.3%
Other OPEC	29	4.0%	38	5.2%	31	4.5%	31	4.1%	40	4.2%	50	4.5%	37	3.4%
Total OPEC	58	8.2%	58	7.9%	43	6.3%	42	5.5%	54	5.6%	63	5.7%	51	4.7%
Brazil	12	1.7%	10	1.4%	8	1.2%	14	1.8%	13	1.3%	14	1.3%	20	1.9%
Mexico	38	5.3%	45	6.1%	46	6.7%	48	6.3%	58	6.1%	67	6.1%	69	6.2%
Other Latin America	81	11.3%	86	11.8%	77	11.2%	86	11.1%	106	11.2%	115	10.4%	101	9.2%
Total Latin America	131	18.3%	141	19.3%	131	19.1%	148	19.2%	177	18.6%	196	17.8%	190	17.3%
South Korea	18	2.5%	18	2.5%	18	2.6%	27	3.6%	43	4.5%	48	4.4%	52	4.8%
Singapore	14	2.0%	13	1.8%	10	1.5%	13	1.7%	16	1.7%	19	1.7%	23	2.1%
Taiwan	21	2.9%	21	2.9%	19	2.8%	27	3.6%	35	3.7%	42	3.8%	34	3.1%
Other Asian NICS	12	1.6%	16	2.2%	16	2.3%	21	2.8%	26	2.8%	32	2.9%	35	3.2%
Total Asian NICS	64	9.0%	68	9.3%	63	9.2%	89	11.6%	121	12.7%	141	12.8%	144	13.2%
Other Developing Countries	38	5.3%	38	5.2%	32	4.7%	34	4.5%	39	4.1%	49	4.4%	54	4.9%
Total Developing Countries	277	38.7%	283	38.7%	250	36.6%	294	38.4%	361	37.9%	416	37.8%	424	38.6%
China	1	0.1%	2	0.3%	5	0.7%	5	0.6%	5	0.6%	10	1.0%	14	1.3%
USSR	4	0.6%	3	0.5%	4	0.6%	4	0.5%	5	0.5%	3	0.3%	1	0.1%
Eastern Europe	2	0.3%	1	0.2%	2	0.3%	2	0.3%	1	0.1%	2	0.2%	1	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	7	1.0%	7	1.0%	11	1.6%	10	1.3%	11	1.2%	15	1.4%	16	1.5%
World	715	100.0%	731	100.0%	685	100.0%	767	100.0%	952	100.0%	1,100	100.0%	1,097	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.13
IMPORTS BY COUNTRY (MILLION DOLLARS)
SITC 53 DYEING, TANNING AND COLORING MATERIALS

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	51	7.9%	62	7.7%	63	7.4%	69	6.4%	80	6.3%	103	7.9%	112	9.9%
Japan	122	19.0%	178	22.2%	195	22.8%	272	25.5%	340	26.9%	260	20.0%	154	13.6%
United Kingdom	60	9.4%	72	9.0%	73	8.5%	91	8.5%	112	8.8%	138	10.6%	109	9.6%
West Germany	164	25.5%	195	24.3%	202	23.6%	268	25.1%	331	26.1%	330	25.4%	316	27.9%
Netherlands	17	2.6%	22	2.7%	23	2.7%	34	3.2%	35	2.8%	39	3.0%	32	2.8%
France	54	8.3%	74	9.2%	68	8.0%	74	6.9%	70	5.5%	75	5.7%	62	5.5%
Italy	7	1.1%	11	1.4%	15	1.7%	18	1.7%	18	1.5%	30	2.3%	26	2.3%
Other E.C.	49	7.7%	52	6.5%	61	7.2%	68	6.4%	74	5.8%	71	5.4%	70	6.2%
Total E.C.	351	54.6%	426	53.1%	442	51.7%	553	51.8%	640	50.5%	683	52.5%	615	54.3%
Other Developed	68	10.5%	72	9.0%	74	8.6%	111	10.4%	125	9.8%	126	9.6%	119	10.5%
Total Developed	592	92.0%	738	91.9%	774	90.5%	1,006	94.1%	1,185	93.5%	1,172	90.0%	1,001	88.3%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other OPEC	15	2.3%	1	0.1%	1	0.2%	2	0.2%	2	0.2%	3	0.2%	1	0.1%
Total OPEC	15	2.3%	1	0.1%	1	0.2%	2	0.2%	2	0.2%	3	0.2%	1	0.1%
Brazil	6	0.9%	9	1.1%	9	1.1%	6	0.6%	6	0.5%	7	0.6%	3	0.2%
Mexico	6	0.9%	25	3.2%	31	3.6%	13	1.3%	20	1.5%	41	3.2%	33	2.9%
Other Latin America	25	3.9%	10	1.3%	10	1.2%	11	1.0%	12	1.0%	15	1.1%	19	1.7%
Total Latin America	36	5.6%	44	5.5%	50	5.9%	31	2.9%	38	3.0%	63	4.9%	55	4.9%
Korea, South	2	0.4%	3	0.4%	5	0.5%	5	0.5%	6	0.5%	8	0.6%	9	0.8%
Singapore	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.0%	1	0.1%	3	0.3%
Taiwan	3	0.5%	5	0.7%	3	0.4%	6	0.5%	8	0.6%	11	0.8%	15	1.3%
Other Asian NICS	1	0.1%	1	0.1%	1	0.1%	1	0.1%	2	0.2%	2	0.2%	3	0.3%
Total Asian NICS	6	1.0%	10	1.3%	9	1.0%	12	1.1%	16	1.3%	22	1.7%	31	2.7%
Other Developing Countries	5	0.7%	7	0.9%	8	0.9%	9	0.9%	17	1.4%	23	1.8%	28	2.4%
Total Developing Countries	48	7.4%	61	7.6%	68	7.9%	53	4.9%	72	5.7%	109	8.3%	114	10.0%
China	3	0.4%	2	0.3%	4	0.5%	6	0.5%	8	0.6%	13	1.0%	14	1.3%
USSR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Eastern Europe	1	0.2%	2	0.2%	9	1.1%	5	0.5%	2	0.2%	8	0.6%	4	0.4%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	4	0.6%	4	0.5%	13	1.5%	11	1.0%	10	0.8%	21	1.6%	19	1.7%
World	644	100.0%	803	100.0%	855	100.0%	1,069	100.0%	1,267	100.0%	1,302	100.0%	1,133	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.14
TRADE BALANCE (MILLION DOLLARS)
SITC 53 DYEING, TANNING AND COLORING MATERIALS

Item/Year	1983	1984	1985	1986	1987	1988	1989
Canada	113	117	109	87	143	124	118
Japan	-71	-123	-133	-204	-264	-166	-61
United Kingdom	-20	-37	-43	-57	-69	-80	-40
West Germany	-138	-168	-174	-239	-287	-286	-279
Netherlands	19	15	11	10	13	20	12
France	-38	-61	-56	-55	-47	-52	-46
Italy	4	-1	-6	-9	-5	-17	-13
Other E.C.	-8	-17	-31	-21	-21	9	11
Total E.C.	-183	-271	-300	-370	-416	-405	-354
Other Developed	-20	-21	-26	-56	-68	-56	-46
Total Developed	-161	-297	-350	-544	-605	-503	-344
Saudi Arabia	30	19	12	11	13	14	14
Other OPEC	14	38	30	29	38	46	36
Total OPEC	44	57	42	40	52	60	50
Brazil	7	1	-1	7	6	7	18
Mexico	32	19	15	35	38	26	35
Other Latin America	56	76	66	74	94	100	82
Total Latin America	94	97	81	117	139	133	135
South Korea	16	15	13	22	37	40	43
Singapore	14	13	10	13	16	18	20
Taiwan	17	16	16	22	27	31	19
Other Asian NICS	11	15	15	20	24	30	32
Total Asian NICS	58	58	54	77	105	119	114
Other Developing Countries	33	31	24	25	22	26	27
Total Developing Countries	229	222	183	241	289	307	310
China	-2	0	1	-1	-2	-3	0
USSR	4	3	4	4	5	3	1
Eastern Europe	1	0	-7	-3	-1	-6	-4
Other CPE	0	0	0	0	0	0	0
Total CPE	3	3	-3	0	1	-6	-3
World	71	-72	-170	-303	-314	-202	-37

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.15
EXPORTS BY COUNTRY (MILLION DOLLARS)
SITC 54 MEDICINAL AND PHARMACEUTICAL PRODUCTS

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	174	7.8%	174	7.5%	181	7.5%	185	7.0%	212	7.8%	255	7.8%	266	7.3%
Japan	504	22.7%	524	22.6%	549	22.7%	576	21.7%	613	22.6%	725	22.2%	785	21.5%
United Kingdom	128	5.8%	140	6.1%	136	5.6%	157	5.9%	154	5.7%	185	5.7%	193	5.3%
West Germany	132	6.0%	174	7.5%	192	7.9%	247	9.3%	264	9.7%	290	8.9%	330	9.0%
Netherlands	51	2.3%	58	2.5%	62	2.6%	64	2.4%	69	2.5%	80	2.4%	142	3.9%
France	166	7.5%	160	6.9%	143	5.9%	154	5.8%	156	5.7%	204	6.2%	231	6.3%
Italy	109	4.9%	108	4.7%	122	5.1%	146	5.5%	155	5.7%	223	6.8%	257	7.0%
Other E.C.	102	4.6%	227	9.8%	260	10.8%	305	11.5%	242	8.9%	339	10.4%	420	11.5%
Total E.C.	816	36.8%	867	37.4%	916	37.9%	1,073	40.3%	1,039	38.2%	1,320	40.5%	1,573	43.0%
Other Developed	236	10.7%	224	9.7%	239	9.9%	283	10.6%	288	10.6%	314	9.6%	344	9.4%
Total Developed	1,730	78.0%	1,789	77.3%	1,885	78.0%	2,118	79.6%	2,153	79.2%	2,614	80.1%	2,968	81.1%
Saudi Arabia	43	2.0%	51	2.2%	48	2.0%	41	1.5%	50	1.8%	54	1.7%	44	1.2%
Other OPEC	75	3.4%	71	3.1%	72	3.0%	72	2.7%	71	2.6%	79	2.4%	51	1.4%
Total OPEC	119	5.3%	122	5.3%	119	4.9%	113	4.2%	120	4.4%	133	4.1%	96	2.6%
Brazil	32	1.4%	22	1.0%	22	0.9%	38	1.4%	36	1.3%	32	1.0%	52	1.4%
Mexico	30	1.3%	38	1.6%	46	1.9%	47	1.8%	48	1.8%	57	1.7%	73	2.0%
Other Latin America	187	8.5%	195	8.4%	196	8.1%	208	7.8%	202	7.4%	210	6.4%	185	5.1%
Total Latin America	249	11.2%	255	11.0%	264	10.9%	293	11.0%	286	10.5%	299	9.2%	310	8.5%
South Korea	22	1.0%	22	1.0%	26	1.1%	24	0.9%	29	1.1%	41	1.2%	43	1.2%
Singapore	7	0.3%	6	0.3%	6	0.3%	8	0.3%	10	0.4%	12	0.4%	16	0.4%
Taiwan	19	0.9%	25	1.1%	26	1.1%	32	1.2%	33	1.2%	45	1.4%	42	1.2%
Other Asian NICS	21	1.0%	26	1.1%	26	1.1%	26	1.0%	33	1.2%	39	1.2%	39	1.1%
Total Asian NICS	69	3.1%	78	3.4%	84	3.5%	90	3.4%	105	3.8%	137	4.2%	140	3.8%
Other Developing Countries	79	3.6%	105	4.5%	105	4.4%	89	3.3%	87	3.2%	124	3.8%	143	3.9%
Total Developing Countries	480	21.6%	517	22.3%	521	21.6%	533	20.0%	541	19.9%	634	19.4%	663	18.1%
China	1	0.1%	1	0.1%	2	0.1%	3	0.1%	18	0.6%	6	0.2%	8	0.2%
USSR	1	0.0%	1	0.1%	1	0.0%	1	0.0%	1	0.0%	2	0.1%	13	0.3%
Eastern Europe	5	0.2%	6	0.3%	8	0.3%	7	0.2%	6	0.2%	5	0.2%	8	0.2%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	8	0.3%	9	0.4%	11	0.5%	11	0.4%	24	0.9%	14	0.4%	29	0.8%
World	2,217	100.0%	2,316	100.0%	2,418	100.0%	2,662	100.0%	2,718	100.0%	3,262	100.0%	3,660	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.16
IMPORTS BY COUNTRY (MILLION DOLLARS)
SITC 54 MEDICINAL AND PHARMACEUTICAL PRODUCTS

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	16	1.9%	21	2.0%	26	2.3%	24	1.9%	32	2.1%	45	2.4%	72	3.4%
Japan	112	13.8%	104	10.0%	115	10.2%	163	13.2%	174	11.6%	195	10.5%	213	10.2%
United Kingdom	134	16.5%	232	22.4%	201	17.8%	207	16.8%	238	15.8%	349	18.9%	367	17.6%
West Germany	132	16.3%	136	13.2%	151	13.4%	190	15.4%	270	17.9%	293	15.8%	304	14.6%
Netherlands	25	3.0%	27	2.6%	39	3.5%	37	3.0%	33	2.2%	28	1.5%	39	1.9%
France	50	6.2%	50	4.8%	52	4.6%	65	5.3%	74	4.9%	78	4.2%	88	4.2%
Italy	84	10.4%	110	10.6%	127	11.2%	108	8.8%	173	11.5%	188	10.1%	157	7.5%
Other E.C.	72	8.8%	132	12.7%	88	7.8%	84	6.9%	134	8.9%	191	10.3%	268	12.9%
Total E.C.	497	61.2%	687	66.3%	658	58.3%	691	56.1%	922	61.1%	1,127	61.0%	1,223	58.6%
Other Developed	109	13.5%	140	13.6%	244	21.6%	254	20.6%	275	18.2%	352	19.0%	460	22.1%
Total Developed	734	90.4%	952	91.9%	1,043	92.4%	1,132	91.9%	1,403	93.0%	1,719	93.0%	1,968	94.4%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other OPEC	1	0.2%	3	0.2%	3	0.2%	3	0.2%	3	0.2%	2	0.1%	3	0.1%
Total OPEC	1	0.2%	3	0.2%	3	0.2%	3	0.2%	3	0.2%	2	0.1%	3	0.1%
Brazil	8	0.9%	5	0.5%	7	0.6%	6	0.5%	8	0.5%	9	0.5%	6	0.3%
Mexico	12	1.5%	12	1.2%	12	1.0%	19	1.5%	23	1.5%	22	1.2%	17	0.8%
Other Latin America	24	2.9%	26	2.5%	22	2.0%	26	2.1%	23	1.5%	30	1.6%	11	0.5%
Total Latin America	44	5.4%	44	4.3%	41	3.6%	51	4.1%	53	3.5%	62	3.3%	33	1.6%
South Korea	2	0.2%	2	0.2%	3	0.3%	3	0.2%	3	0.2%	2	0.1%	2	0.1%
Singapore	0	0.0%	5	0.4%	1	0.1%	1	0.1%	3	0.2%	9	0.5%	3	0.1%
Taiwan	0	0.1%	2	0.1%	2	0.1%	1	0.1%	2	0.1%	2	0.1%	3	0.1%
Other Asian NICS	0	0.0%	1	0.1%	1	0.1%	2	0.2%	2	0.1%	2	0.1%	2	0.1%
Total Asian NICS	3	0.3%	10	0.9%	6	0.5%	7	0.6%	10	0.6%	16	0.9%	9	0.4%
Other Developing Countries	4	0.5%	5	0.5%	9	0.8%	8	0.7%	9	0.6%	18	1.0%	13	0.6%
Total Developing Countries	52	6.4%	61	5.9%	58	5.2%	69	5.6%	74	4.9%	97	5.3%	57	2.7%
China	21	2.6%	17	1.7%	21	1.9%	21	1.7%	25	1.6%	26	1.4%	50	2.4%
USSR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Eastern Europe	5	0.6%	5	0.5%	7	0.6%	9	0.7%	7	0.5%	7	0.4%	10	0.5%
Total CPE	26	3.2%	22	2.2%	28	2.5%	30	2.5%	32	2.1%	33	1.8%	60	2.9%
World	812	100.0%	1,036	100.0%	1,129	100.0%	1,231	100.0%	1,509	100.0%	1,849	100.0%	2,086	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.17
TRADE BALANCE (MILLION DOLLARS)
SITC 54 MEDICINAL AND PHARMACEUTICAL PRODUCTS

Item/Year	1983	1984	1985	1986	1987	1988	1989
Canada	158	153	155	162	181	210	194
Japan	392	420	434	413	439	530	572
United Kingdom	-6	-92	-65	-50	-84	-164	-174
West Germany	0	37	40	57	-6	-3	26
Netherlands	27	31	23	27	36	52	103
France	116	109	92	89	82	125	142
Italy	24	-1	-5	38	-17	35	100
Other E.C.	158	96	172	221	107	148	152
Total E.C.	319	180	257	382	117	193	350
Other Developed	127	84	-4	30	13	-38	-116
Total Developed	996	838	842	987	749	895	999
Saudi Arabia	43	51	48	41	50	54	44
Other OPEC	74	68	69	69	68	77	49
Total OPEC	117	120	117	110	117	131	93
Brazil	25	17	14	32	28	23	46
Mexico	18	25	35	28	25	35	57
Other Latin America	163	169	173	182	180	180	174
Total Latin America	206	211	223	242	233	237	277
South Korea	20	20	23	21	26	38	41
Singapore	6	1	6	7	6	3	14
Taiwan	19	23	24	31	31	43	39
Other Asian NICS	21	25	25	23	31	37	37
Total Asian NICS	66	69	78	83	95	121	131
Other Developing Countries	75	100	97	81	79	107	130
Total Developing Countries	428	456	463	464	467	537	606
China	-19	-16	-19	-18	-7	-19	-42
USSR	1	1	1	1	1	2	13
Eastern Europe	0	1	2	-2	-1	-2	-3
Other CPE	0	0	0	0	0	0	0
Total CPE	-18	-13	-16	-20	-8	-19	-32
World	1405	1280	1288	1431	1209	1413	1574

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.18
EXPORTS BY COUNTRY (MILLION DOLLARS)
SITC 55 ESSENTIAL OILS AND PERFUME MATERIALS; TOILET, POLISHING AND CLEANSING PREPARATIONS

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	118	14.8%	116	14.3%	103	13.3%	105	13.0%	140	14.7%	165	14.6%	215	14.7%
Japan	58	7.2%	74	9.2%	71	9.2%	78	9.7%	125	13.1%	111	9.9%	163	11.1%
United Kingdom	58	7.3%	60	7.4%	66	8.6%	65	8.0%	73	7.6%	101	9.0%	123	8.4%
West Germany	34	4.3%	25	3.0%	24	3.1%	25	3.1%	30	3.2%	40	3.5%	45	3.1%
Netherlands	24	3.1%	24	3.0%	24	3.1%	29	3.6%	34	3.5%	43	3.8%	43	2.9%
France	23	2.8%	25	3.1%	30	3.9%	24	2.9%	29	3.1%	41	3.7%	48	3.3%
Italy	8	1.0%	7	0.8%	8	1.0%	9	1.1%	10	1.0%	17	1.5%	23	1.6%
Other E.C.	36	4.5%	30	3.6%	34	4.4%	32	4.0%	34	3.6%	43	3.9%	59	4.0%
Total E.C.	183	23.0%	171	21.0%	186	24.1%	185	22.8%	210	22.0%	286	25.4%	341	23.2%
Other Developed	65	8.2%	71	8.7%	67	8.6%	74	9.2%	80	8.4%	89	7.9%	116	7.9%
Total Developed	423	53.2%	432	53.2%	426	55.2%	442	54.7%	553	58.1%	651	57.8%	835	56.9%
Saudi Arabia	39	4.9%	31	3.8%	28	3.7%	20	2.5%	24	2.6%	21	1.9%	23	1.6%
Other OPEC	54	6.8%	55	6.8%	48	6.3%	42	5.2%	53	5.6%	66	5.9%	64	4.3%
Total OPEC	93	11.7%	86	10.6%	77	9.9%	62	7.7%	77	8.1%	87	7.7%	87	5.9%
Brazil	10	1.2%	7	0.8%	7	0.9%	9	1.2%	9	0.9%	10	0.9%	16	1.1%
Mexico	18	2.2%	21	2.6%	25	3.2%	26	3.2%	26	2.7%	35	3.1%	83	5.6%
Other Latin America	162	20.4%	165	20.3%	143	18.5%	153	18.9%	166	17.5%	184	16.4%	222	15.1%
Total Latin America	190	23.8%	193	23.7%	175	22.7%	189	23.3%	201	21.1%	230	20.4%	320	21.8%
South Korea	11	1.4%	14	1.7%	12	1.5%	16	1.9%	19	2.0%	29	2.5%	40	2.7%
Singapore	13	1.7%	15	1.8%	13	1.7%	15	1.8%	16	1.7%	20	1.7%	31	2.1%
Taiwan	11	1.3%	16	2.0%	12	1.6%	21	2.5%	19	2.0%	26	2.3%	36	2.4%
Other Asian NICS	28	3.6%	33	4.1%	32	4.1%	35	4.3%	38	4.0%	43	3.8%	50	3.4%
Total Asian NICS	64	8.0%	78	9.6%	69	8.9%	86	10.6%	93	9.8%	118	10.4%	157	10.7%
Other Developing Countries	49	6.2%	47	5.8%	44	5.7%	46	5.7%	50	5.2%	61	5.4%	77	5.3%
Total Developing Countries	370	46.5%	378	46.4%	342	44.3%	361	44.6%	394	41.5%	469	41.7%	620	42.2%
China	0	0.0%	1	0.1%	1	0.2%	2	0.3%	3	0.3%	5	0.4%	7	0.5%
USSR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	0.3%
Eastern Europe	2	0.2%	2	0.3%	2	0.3%	3	0.4%	1	0.1%	1	0.1%	2	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	2	0.3%	3	0.4%	4	0.5%	6	0.7%	4	0.4%	6	0.5%	13	0.9%
World	795	100.0%	813	100.0%	772	100.0%	809	100.0%	951	100.0%	1,126	100.0%	1,469	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.19
IMPORTS BY COUNTRY (MILLION DOLLARS)
SITC 55 ESSENTIAL OILS AND PERFUME MATERIALS; TOILET, POLISHING AND CLEANSING PREPARATIONS

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	34	7.5%	41	6.5%	66	9.0%	81	9.2%	80	8.1%	95	8.1%	133	11.5%
Japan	23	5.0%	30	4.8%	34	4.6%	45	5.1%	56	5.7%	74	6.3%	65	5.6%
	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
United Kingdom	31	6.8%	41	6.6%	61	8.2%	67	7.6%	66	6.7%	84	7.2%	56	4.8%
West Germany	43	9.6%	64	10.1%	67	9.1%	82	9.3%	92	9.4%	103	8.8%	79	6.8%
Netherlands	9	2.0%	9	1.4%	14	1.8%	22	2.5%	18	1.9%	24	2.0%	17	1.4%
France	157	34.8%	233	37.1%	250	34.0%	278	31.7%	328	33.4%	420	35.7%	448	38.5%
Italy	10	2.2%	18	2.9%	22	3.0%	29	3.3%	38	3.9%	38	3.2%	33	2.9%
Other E.C.	23	5.1%	33	5.3%	38	5.1%	38	4.3%	55	5.5%	49	4.2%	50	4.3%
Total E.C.	273	60.5%	399	63.4%	451	61.2%	515	58.8%	598	60.9%	718	61.1%	682	58.6%
	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other Developed	26	5.8%	42	6.6%	44	5.9%	62	7.0%	62	6.3%	74	6.3%	70	6.0%
Total Developed	355	78.7%	511	81.3%	595	80.7%	703	80.2%	796	81.0%	960	81.7%	951	81.7%
	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other OPEC	13	2.8%	14	2.2%	14	2.0%	24	2.7%	19	2.0%	23	1.9%	15	1.3%
Total OPEC	13	2.8%	14	2.2%	14	2.0%	24	2.7%	19	2.0%	23	1.9%	15	1.3%
	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Brazil	8	1.8%	13	2.0%	16	2.2%	14	1.6%	15	1.6%	24	2.0%	32	2.8%
Mexico	17	3.7%	18	2.9%	17	2.3%	22	2.5%	33	3.4%	37	3.2%	39	3.3%
Other Latin America	25	5.4%	25	4.0%	32	4.3%	39	4.4%	32	3.2%	36	3.1%	36	3.1%
Total Latin America	50	11.0%	56	8.9%	65	8.8%	75	8.5%	80	8.2%	97	8.3%	107	9.2%
	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
South Korea	1	0.3%	2	0.3%	3	0.4%	6	0.7%	6	0.6%	6	0.5%	6	0.6%
Singapore	2	0.5%	2	0.4%	3	0.4%	5	0.6%	8	0.8%	8	0.7%	6	0.5%
Taiwan	2	0.5%	4	0.7%	13	1.8%	29	3.4%	30	3.1%	29	2.4%	30	2.6%
Other Asian NICS	1	0.3%	3	0.5%	3	0.5%	3	0.4%	4	0.4%	5	0.4%	8	0.7%
Total Asian NICS	7	1.6%	12	1.9%	22	3.0%	43	5.0%	48	4.9%	48	4.0%	50	4.3%
	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other Developing Countries	11	2.5%	20	3.2%	28	3.8%	24	2.8%	26	2.7%	27	2.3%	25	2.1%
Total Developing Countries	80	17.8%	101	16.1%	126	17.1%	156	17.8%	169	17.2%	191	16.2%	193	16.6%
	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
China	15	3.3%	15	2.4%	15	2.0%	16	1.8%	16	1.6%	24	2.1%	20	1.7%
USSR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Eastern Europe	1	0.3%	1	0.2%	1	0.1%	1	0.1%	1	0.1%	1	0.0%	1	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	16	3.6%	17	2.7%	16	2.1%	17	1.9%	17	1.7%	25	2.1%	21	1.8%
	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
World	452	100.0%	629	100.0%	737	100.0%	876	100.0%	982	100.0%	1,175	100.0%	1,165	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.20
TRADE BALANCE (MILLION DOLLARS)
SITC 55 ESSENTIAL OILS AND PERFUME MATERIALS; TOILET, POLISHING AND CLEANSING PREPARATIONS

Item/Year	1983	1984	1985	1986	1987	1988	1989
Canada	84	76	36	24	60	70	82
Japan	35	44	37	33	68	37	97
United Kingdom	28	19	6	-2	7	17	67
West Germany	-9	-39	-43	-57	-62	-63	-34
Netherlands	15	15	10	7	16	20	26
France	-135	-208	-220	-254	-299	-378	-400
Italy	-2	-11	-14	-20	-29	-21	-10
Other E.C.	12	-4	-4	-6	-20	-6	10
Total E.C.	-90	-228	-265	-331	-388	-432	-341
Other Developed	39	29	23	13	18	15	46
Total Developed	68	-79	-169	-260	-243	-309	-116
Saudi Arabia	39	31	28	20	24	21	23
Other OPEC	42	42	34	18	33	43	49
Total OPEC	80	72	62	38	58	64	72
Brazil	2	-6	-9	-4	-7	-14	-16
Mexico	1	3	8	4	-7	-2	44
Other Latin America	137	140	111	114	134	148	186
Total Latin America	140	137	110	114	120	132	213
South Korea	10	12	9	10	13	22	33
Singapore	11	12	10	10	9	12	25
Taiwan	9	12	-1	-9	-11	-2	6
Other Asian NICS	27	30	28	32	34	38	43
Total Asian NICS	57	67	47	42	45	70	107
Other Developing Countries	38	27	16	22	23	34	53
Total Developing Countries	290	277	216	205	225	278	427
China	-15	-15	-13	-13	-13	-20	-13
USSR	0	0	0	0	0	0	4
Eastern Europe	1	1	1	2	0	0	1
Other CPE	0	0	0	0	0	0	0
Total CPE	-14	-14	-12	-11	-13	-19	-8
World	344	183	35	-67	-31	-50	304

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.21
EXPORTS BY COUNTRY (MILLION DOLLARS)
SITC 56 FERTILIZERS

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	119	8.9%	200	9.1%	171	9.8%	106	11.5%	110	10.2%	115	9.6%	245	8.7%
Japan	103	7.7%	156	7.1%	108	6.2%	48	5.1%	73	6.8%	79	6.6%	151	5.3%
United Kingdom	1	0.1%	1	0.0%	1	0.0%	1	0.1%	2	0.2%	1	0.0%	5	0.2%
West Germany	24	1.8%	34	1.5%	30	1.7%	22	2.3%	20	1.8%	12	1.0%	41	1.4%
Netherlands	0	0.0%	19	0.8%	19	1.1%	9	0.9%	10	0.9%	12	1.0%	37	1.3%
France	15	1.1%	23	1.1%	28	1.6%	19	2.0%	45	4.1%	39	3.3%	70	2.5%
Italy	34	2.5%	56	2.5%	36	2.0%	23	2.5%	35	3.2%	22	1.9%	33	1.2%
Other EC	158	11.8%	178	8.1%	108	6.2%	60	6.5%	103	9.5%	67	5.6%	171	6.1%
Total EC	232	17.4%	310	14.1%	222	12.7%	133	14.3%	214	19.7%	154	12.8%	357	12.6%
Other Developed	120	9.0%	164	7.4%	139	7.9%	68	7.3%	91	8.4%	77	6.4%	214	7.6%
Total Developed	573	43.0%	830	37.7%	640	36.6%	356	38.3%	488	45.0%	425	35.5%	967	34.3%
Saudi Arabia	2	0.2%	4	0.2%	1	0.1%	5	0.5%	8	0.8%	8	0.7%	5	0.2%
Other OPEC	33	2.5%	64	2.9%	33	1.9%	20	2.1%	50	4.6%	54	4.5%	97	3.4%
Total OPEC	36	2.7%	68	3.1%	35	2.0%	25	2.7%	58	5.4%	62	5.1%	102	3.6%
Brazil	19	1.4%	87	3.9%	45	2.6%	75	8.1%	51	4.7%	47	3.9%	52	1.8%
Mexico	51	3.8%	82	3.7%	55	3.1%	24	2.6%	24	2.3%	13	1.1%	55	1.9%
Other Latin America	156	11.7%	204	9.3%	184	10.5%	102	11.0%	120	11.1%	138	11.5%	287	10.2%
Total Latin America	226	17.0%	373	16.9%	284	16.2%	201	21.6%	195	18.0%	197	16.5%	394	14.0%
South Korea	3	0.2%	48	2.2%	46	2.6%	29	3.1%	31	2.9%	34	2.9%	62	2.2%
Singapore	13	1.0%	5	0.2%	0	0.0%	2	0.2%	0	0.0%	0	0.0%	0	0.0%
Taiwan	60	4.5%	116	5.3%	24	1.4%	1	0.1%	3	0.3%	1	0.1%	2	0.1%
Other Asian NICS	0	0.0%	6	0.3%	22	1.3%	0	0.0%	1	0.1%	2	0.2%	7	0.3%
Total Asian NICS	76	5.7%	176	8.0%	93	5.3%	32	3.4%	37	3.4%	38	3.2%	71	2.5%
Other Developing Countries	179	13.5%	410	18.6%	442	25.3%	137	14.8%	77	7.1%	199	16.6%	595	21.1%
Total Developing Countries	504	37.9%	1,001	45.4%	835	47.7%	379	40.8%	337	31.1%	475	39.6%	1,099	38.9%
China	168	12.6%	267	12.1%	139	8.0%	46	5.0%	130	12.0%	182	15.2%	487	17.3%
USSR	58	4.3%	47	2.1%	100	5.7%	126	13.5%	110	10.1%	107	8.9%	237	8.4%
Eastern Europe	29	2.2%	58	2.6%	36	2.1%	23	2.4%	20	1.8%	10	0.8%	31	1.1%
Total CPE	254	19.1%	372	16.9%	276	15.8%	194	20.9%	259	23.9%	298	24.9%	755	26.8%
World	1,332	100.0%	2,203	100.0%	1,750	100.0%	929	100.0%	1,084	100.0%	1,199	100.0%	2,821	100.0%

Source: U.S. Department of Commerce
Standard International Code, Revision 3

TABLE 3.22
IMPORTS BY COUNTRY (MILLION DOLLARS)
SITC 56 FERTILIZERS

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	735	75.2%	831	74.5%	666	70.5%	569	68.0%	579	75.4%	715	72.2%	708	70.9%
Japan	4	0.4%	5	0.4%	5	0.6%	3	0.3%	3	0.4%	4	0.4%	10	1.0%
United Kingdom	1	0.1%	1	0.1%	1	0.1%	1	0.1%	3	0.4%	4	0.4%	3	0.3%
West Germany	15	1.6%	20	1.8%	18	1.9%	17	2.1%	19	2.4%	32	3.2%	18	1.8%
Netherlands	44	4.5%	34	3.0%	53	5.6%	39	4.7%	27	3.5%	27	2.8%	33	3.3%
France	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	0.4%	2	0.2%
Italy	0	0.0%	6	0.5%	7	0.7%	10	1.2%	6	0.8%	13	1.3%	6	0.6%
Other E.C.	11	1.2%	16	1.4%	12	1.2%	8	1.0%	6	0.7%	11	1.1%	8	0.8%
Total E.C.	72	7.4%	77	6.9%	91	9.6%	76	9.1%	60	7.9%	91	9.2%	70	7.0%
Other Developed	11	1.1%	14	1.2%	21	2.3%	13	1.6%	17	2.2%	21	2.2%	26	2.6%
Total Developed	822	84.1%	926	83.1%	784	82.9%	661	79.0%	660	85.9%	832	83.9%	814	81.5%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	4	0.5%	0	0.0%	0	0.0%	2	0.2%
Other OPEC	24	2.5%	11	1.0%	10	1.1%	14	1.7%	25	3.2%	25	2.5%	39	3.9%
Total OPEC	24	2.5%	11	1.0%	10	1.1%	18	2.2%	25	3.2%	25	2.5%	41	4.1%
Brazil	5	0.5%	0	0.0%	1	0.1%	0	0.0%	0	0.1%	0	0.0%	5	0.5%
Mexico	8	0.8%	4	0.4%	1	0.1%	3	0.3%	6	0.7%	3	0.3%	10	1.0%
Other Latin America	24	2.4%	14	1.3%	10	1.1%	17	2.1%	25	3.3%	45	4.5%	32	3.2%
Total Latin America	37	3.7%	19	1.7%	12	1.3%	20	2.4%	32	4.1%	48	4.9%	47	4.8%
South Korea	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Taiwan	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other Asian NICS	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total Asian NICS	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other Developing Countries	43	4.4%	39	3.5%	32	3.4%	21	2.6%	30	3.9%	47	4.8%	44	4.4%
Total Developing Countries	89	9.1%	60	5.3%	54	5.7%	55	6.6%	80	10.4%	106	10.7%	123	12.3%
China	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.1%	0	0.0%	2	0.2%
USSR	43	4.4%	54	4.8%	57	6.0%	60	7.1%	11	1.4%	24	2.4%	9	0.9%
Eastern Europe	24	2.5%	75	6.7%	50	5.3%	61	7.3%	17	2.2%	29	2.9%	52	5.2%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	67	6.9%	129	11.5%	108	11.4%	120	14.4%	28	3.7%	53	5.4%	62	6.3%
World	977	100.0%	1,115	100.0%	945	100.0%	837	100.0%	768	100.0%	991	100.0%	999	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.23
TRADE BALANCE (MILLION DOLLARS)
SITC 56 FERTILIZERS

Item/Year	1983	1984	1985	1986	1987	1988	1989
Canada	-616	-631	-495	-463	-469	-600	-463
Japan	99	151	103	45	70	76	141
United Kingdom	0	0	-1	-1	-1	-4	2
West Germany	9	13	12	4	1	-19	23
Netherlands	-44	-15	-34	-30	-17	-15	4
France	15	23	28	19	45	36	68
Italy	34	50	29	13	28	9	27
Other E.C.	146	163	96	52	97	56	163
Total E.C.	160	233	131	57	154	62	287
Other Developed	109	150	117	55	74	56	188
Total Developed	-248	-96	-144	-306	-171	-406	153
Saudi Arabia	2	4	1	1	8	8	4
Other OPEC	9	53	23	6	25	29	57
Total OPEC	11	58	25	6	34	37	61
Brazil	13	86	45	75	50	46	47
Mexico	44	78	54	22	19	10	45
Other Latin America	133	190	173	85	95	93	255
Total Latin America	190	354	272	181	164	149	347
South Korea	3	48	46	29	31	34	61
Singapore	13	5	0	2	0	0	0
Taiwan	60	116	24	1	3	1	2
Other Asian NICS	0	6	22	0	1	2	7
Total Asian NICS	76	176	93	32	37	38	71
Other Developing Countries	136	371	411	116	47	151	551
Total Developing Countries	416	942	781	324	257	369	976
China	168	267	139	46	129	182	486
USSR	15	-7	43	66	99	83	228
Eastern Europe	5	-17	-14	-38	3	-19	-21
Other CPE	0	0	0	0	0	0	0
Total CPE	187	243	168	74	231	245	693
World	355	1089	805	92	317	208	1822

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.24
EXPORTS BY COUNTRY (MILLION DOLLARS)
SITC 57 PLASTICS IN PRIMARY FORMS

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	381	13.9%	394	13.5%	374	13.7%	387	12.4%	552	13.7%	625	11.4%	704	12.3%
Japan	252	9.2%	276	9.4%	223	8.2%	234	7.5%	294	7.3%	397	7.2%	443	7.7%
United Kingdom	120	4.4%	134	4.6%	113	4.1%	122	3.9%	149	3.7%	172	3.1%	230	4.0%
West Germany	61	2.2%	66	2.3%	88	3.2%	110	3.5%	110	2.7%	138	2.5%	180	3.1%
Netherlands	137	5.0%	196	6.7%	198	7.3%	196	6.3%	207	5.1%	311	5.7%	370	6.5%
France	36	1.3%	31	1.1%	34	1.2%	40	1.3%	46	1.1%	55	1.0%	81	1.4%
Italy	20	0.7%	30	1.0%	29	1.1%	34	1.1%	49	1.2%	62	1.1%	74	1.3%
Other E.C.	213	7.8%	232	7.9%	229	8.4%	261	8.4%	300	7.4%	388	7.0%	462	8.1%
Total E.C.	588	21.5%	689	23.6%	691	25.3%	763	24.4%	861	21.4%	1,125	20.4%	1,397	24.4%
Other Developed	158	5.8%	158	5.4%	155	5.7%	163	5.2%	219	5.4%	287	5.2%	347	6.1%
Total Developed	1,379	50.4%	1,517	51.9%	1,443	52.9%	1,547	49.6%	1,927	47.8%	2,434	44.2%	2,891	50.5%
Saudi Arabia	40	1.4%	37	1.3%	30	1.1%	20	0.7%	19	0.5%	30	0.5%	21	0.4%
Other OPEC	181	6.6%	185	6.3%	156	5.7%	214	6.9%	230	5.7%	276	5.0%	244	4.3%
Total OPEC	220	8.0%	222	7.6%	186	6.8%	235	7.5%	249	6.2%	306	5.6%	265	4.6%
Brazil	49	1.8%	40	1.4%	44	1.6%	55	1.8%	53	1.3%	59	1.1%	99	1.7%
Mexico	230	8.4%	209	7.1%	250	9.2%	264	8.5%	296	7.3%	409	7.4%	542	9.5%
Other Latin America	289	10.6%	314	10.7%	269	9.9%	346	11.1%	466	11.6%	580	10.5%	503	8.8%
Total Latin America	569	20.8%	563	19.2%	564	20.6%	665	21.3%	815	20.2%	1,049	19.1%	1,145	20.0%
South Korea	95	3.5%	102	3.5%	80	2.9%	121	3.9%	183	4.5%	212	3.8%	242	4.2%
Singapore	55	2.0%	44	1.5%	27	1.0%	42	1.4%	67	1.7%	99	1.8%	141	2.5%
Taiwan	97	3.5%	93	3.2%	67	2.4%	119	3.8%	210	5.2%	282	5.1%	284	5.0%
Other Asian NICS	87	3.2%	94	3.2%	82	3.0%	146	4.7%	238	5.9%	432	7.9%	316	5.5%
Total Asian NICS	333	12.2%	332	11.3%	256	9.4%	428	13.7%	698	17.3%	1,025	18.6%	983	17.2%
Other Developing Countries	199	7.3%	141	4.8%	124	4.5%	150	4.8%	219	5.4%	275	5.0%	326	5.7%
Total Developing Countries	1,262	46.1%	1,171	40.0%	1,056	38.7%	1,380	44.2%	1,863	46.2%	2,488	45.2%	2,620	45.8%
China	92	3.4%	234	8.0%	226	8.3%	191	6.1%	239	5.9%	575	10.5%	197	3.4%
USSR	3	0.1%	4	0.1%	3	0.1%	2	0.1%	1	0.0%	1	0.0%	10	0.2%
Eastern Europe	1	0.0%	1	0.0%	2	0.1%	1	0.0%	2	0.1%	4	0.1%	8	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.0%	0	0.0%
Total CPE	96	3.5%	238	8.1%	231	8.5%	194	6.2%	243	6.0%	581	10.6%	215	3.8%
World	2,737	100.0%	2,926	100.0%	2,730	100.0%	3,121	100.0%	4,033	100.0%	5,503	100.0%	5,727	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.25
IMPORTS BY COUNTRY (MILLION DOLLARS)
SITC 57 PLASTICS IN PRIMARY FORMS

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	90	16.6%	143	18.4%	185	21.5%	228	22.6%	281	25.3%	445	32.4%	496	29.4%
Japan	142	26.2%	179	23.1%	185	21.5%	190	18.9%	219	19.7%	219	15.9%	305	18.0%
United Kingdom	35	6.5%	51	6.5%	61	7.1%	89	8.8%	86	7.7%	105	7.6%	138	8.2%
West Germany	95	17.6%	119	15.3%	122	14.2%	149	14.8%	174	15.6%	186	13.5%	232	13.7%
Netherlands	18	3.3%	29	3.8%	43	5.0%	42	4.1%	43	3.9%	52	3.8%	61	3.6%
France	39	7.3%	50	6.4%	68	7.8%	69	6.9%	63	5.7%	70	5.1%	86	5.1%
Italy	14	2.6%	19	2.4%	22	2.6%	26	2.6%	27	2.5%	26	1.9%	46	2.7%
Other E.C.	15	2.9%	26	3.4%	28	3.3%	34	3.4%	36	3.3%	37	2.7%	78	4.6%
Total E.C.	217	40.1%	294	37.8%	344	40.0%	409	40.7%	429	38.5%	476	34.6%	640	37.9%
Other Developed	14	2.6%	21	2.7%	26	3.0%	29	2.9%	32	2.8%	37	2.7%	60	3.6%
Total Developed	462	85.5%	637	82.0%	740	85.9%	857	85.2%	961	86.3%	1,176	85.7%	1,501	89.0%
Saudi Arabia	0	0.0%	0	0.0%	3	0.3%	11	1.1%	4	0.4%	7	0.5%	3	0.2%
Other OPEC	0	0.0%	4	0.5%	2	0.2%	1	0.1%	0	0.0%	0	0.0%	4	0.3%
Total OPEC	0	0.0%	4	0.5%	4	0.5%	12	1.2%	4	0.4%	8	0.5%	8	0.5%
Brazil	8	1.5%	37	4.7%	15	1.7%	18	1.8%	12	1.1%	21	1.5%	28	1.6%
Mexico	21	3.8%	35	4.5%	36	4.1%	35	3.4%	49	4.4%	68	5.0%	35	2.1%
Other Latin America	14	2.7%	23	2.9%	13	1.5%	14	1.3%	7	0.6%	20	1.5%	28	1.6%
Total Latin America	43	8.0%	94	12.1%	63	7.3%	66	6.6%	68	6.1%	109	7.9%	91	5.4%
South Korea	5	0.9%	7	0.8%	8	1.0%	11	1.1%	12	1.1%	6	0.5%	14	0.8%
Singapore	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.1%	2	0.1%
Taiwan	21	3.9%	23	3.0%	29	3.4%	43	4.3%	45	4.0%	44	3.2%	47	2.8%
Other Asian NICS	0	0.0%	1	0.1%	1	0.1%	1	0.1%	1	0.1%	1	0.0%	1	0.1%
Total Asian NICS	26	4.8%	31	3.9%	39	4.5%	56	5.6%	58	5.2%	52	3.8%	64	3.8%
Other Developing Countries	6	1.2%	8	1.0%	11	1.2%	11	1.1%	18	1.6%	18	1.3%	18	1.1%
Total Developing Countries	76	14.0%	132	17.1%	115	13.4%	144	14.3%	148	13.3%	186	13.5%	176	10.4%
China	2	0.4%	5	0.6%	2	0.2%	3	0.3%	3	0.3%	8	0.6%	9	0.5%
USSR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Eastern Europe	1	0.1%	3	0.4%	4	0.5%	2	0.2%	1	0.1%	3	0.2%	1	0.1%
Total CPE	3	0.5%	7	0.9%	6	0.7%	5	0.5%	5	0.4%	11	0.8%	10	0.6%
World	541	100.0%	777	100.0%	861	100.0%	1,006	100.0%	1,113	100.0%	1,373	100.0%	1,687	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.26
TRADE BALANCE (MILLION DOLLARS)
SITC 57 PLASTICS IN PRIMARY FORMS

Item/Year	1983	1984	1985	1986	1987	1988	1989
Canada	291	251	189	159	270	181	208
Japan	111	97	38	44	76	178	139
United Kingdom	85	83	52	33	63	67	92
West Germany	-34	-53	-33	-39	-64	-48	-52
Netherlands	119	166	155	154	164	259	309
France	-3	-18	-34	-29	-17	-15	-5
Italy	6	11	7	8	22	36	29
Other E.C.	197	206	200	226	264	351	384
Total E.C.	371	396	347	353	432	650	757
Other Developed	144	137	129	134	188	250	287
Total Developed	917	881	703	690	966	1259	1390
Saudi Arabia	40	37	27	10	15	23	18
Other OPEC	181	181	154	213	230	276	239
Total OPEC	220	218	181	223	245	299	257
Brazil	41	3	30	37	41	38	71
Mexico	210	174	215	230	247	341	507
Other Latin America	275	292	256	332	459	560	476
Total Latin America	525	469	501	599	747	940	1054
South Korea	90	95	72	110	171	205	228
Singapore	55	44	27	42	67	98	139
Taiwan	76	70	37	75	165	238	237
Other Asian NICS	87	93	81	145	237	432	315
Total Asian NICS	307	301	217	372	640	974	919
Other Developing Countries	193	134	113	139	202	257	307
Total Developing Countries	1187	1038	941	1236	1716	2302	2444
China	90	229	225	188	236	567	188
USSR	3	4	3	2	1	1	10
Eastern Europe	1	-2	-3	-1	1	1	7
Other CPE	0	0	0	0	0	1	0
Total CPE	93	231	225	188	238	570	206
World	2197	2149	1869	2114	2920	4130	4040

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.27
EXPORTS BY COUNTRY (MILLION DOLLARS)
SITC 58 PLASTICS IN NON-PRIMARY FORMS

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	328	26.3%	350	25.5%	304	23.9%	291	21.0%	395	23.8%	445	22.3%	433	19.7%
Japan	96	7.7%	103	7.5%	103	8.1%	112	8.0%	141	8.5%	162	8.1%	188	8.5%
United Kingdom	66	5.3%	79	5.8%	76	6.0%	88	6.4%	90	5.4%	113	5.7%	135	6.1%
West Germany	59	4.7%	72	5.3%	72	5.7%	102	7.4%	98	5.9%	132	6.6%	100	4.5%
Netherlands	23	1.8%	26	1.9%	33	2.6%	44	3.2%	51	3.1%	63	3.1%	87	3.9%
France	40	3.2%	42	3.0%	39	3.1%	41	3.0%	51	3.1%	51	2.6%	60	2.7%
Italy	14	1.1%	17	1.2%	19	1.5%	19	1.4%	23	1.4%	29	1.4%	47	2.1%
Other E.C.	104	8.4%	122	8.9%	100	7.8%	108	7.8%	132	8.0%	131	6.5%	188	8.5%
Total E.C.	307	24.6%	358	26.1%	338	26.6%	403	29.0%	446	26.9%	519	26.0%	616	28.0%
Other Developed	115	9.3%	134	9.8%	111	8.7%	127	9.2%	142	8.6%	164	8.2%	196	8.9%
Total Developed	846	67.8%	946	68.8%	856	67.3%	933	67.3%	1,124	67.7%	1,290	64.5%	1,432	65.1%
Saudi Arabia	42	3.4%	24	1.8%	16	1.3%	9	0.7%	10	0.6%	15	0.7%	18	0.8%
Other OPEC	41	3.3%	46	3.4%	28	2.2%	25	1.8%	26	1.6%	30	1.5%	42	1.9%
Total OPEC	83	6.7%	71	5.1%	44	3.4%	35	2.5%	36	2.2%	45	2.2%	61	2.8%
Brazil	16	1.3%	22	1.6%	20	1.6%	28	2.0%	21	1.2%	28	1.4%	34	1.5%
Mexico	71	5.7%	103	7.5%	136	10.7%	145	10.5%	184	11.1%	277	13.9%	281	12.7%
Other Latin America	110	8.8%	113	8.2%	84	6.6%	89	6.4%	95	5.7%	102	5.1%	113	5.1%
Total Latin America	197	15.8%	238	17.3%	240	18.9%	262	18.9%	300	18.1%	408	20.4%	427	19.4%
South Korea	11	0.9%	17	1.2%	11	0.9%	14	1.0%	25	1.5%	41	2.0%	47	2.2%
Singapore	13	1.0%	15	1.1%	16	1.2%	15	1.1%	18	1.1%	24	1.2%	58	2.6%
Taiwan	9	0.8%	11	0.8%	10	0.8%	19	1.4%	29	1.7%	38	1.9%	42	1.9%
Other Asian NICS	14	1.1%	13	1.0%	14	1.1%	19	1.4%	26	1.6%	51	2.6%	44	2.0%
Total Asian NICS	48	3.8%	55	4.0%	52	4.1%	67	4.9%	98	5.9%	154	7.7%	191	8.7%
Other Developing Countries	33	2.6%	37	2.7%	27	2.1%	32	2.3%	37	2.3%	46	2.3%	49	2.2%
Total Developing Countries	335	26.9%	368	26.8%	345	27.1%	381	27.4%	454	27.3%	633	31.6%	716	32.5%
China	1	0.1%	2	0.1%	3	0.2%	4	0.3%	16	0.9%	21	1.1%	16	0.7%
USSR	64	5.1%	57	4.1%	66	5.2%	59	4.3%	65	3.9%	55	2.8%	37	1.7%
Eastern Europe	2	0.1%	2	0.1%	2	0.2%	10	0.7%	1	0.1%	2	0.1%	1	0.0%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	66	5.3%	60	4.4%	71	5.6%	74	5.3%	82	4.9%	78	3.9%	54	2.4%
World	1,247	100.0%	1,374	100.0%	1,272	100.0%	1,387	100.0%	1,660	100.0%	2,001	100.0%	2,202	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.28
IMPORTS BY COUNTRY (MILLION DOLLARS)
SITC 58 PLASTICS IN NON-PRIMARY FORMS

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	150	19.9%	197	20.6%	196	19.4%	226	19.3%	262	19.7%	347	22.0%	356	21.9%
Japan	136	18.0%	183	19.1%	209	20.7%	264	22.6%	301	22.7%	338	21.5%	339	20.8%
United Kingdom	63	8.4%	59	6.2%	60	5.9%	62	5.3%	76	5.7%	98	6.2%	91	5.6%
West Germany	108	14.3%	120	12.6%	125	12.4%	143	12.2%	150	11.3%	170	10.8%	189	11.6%
Netherlands	4	0.5%	7	0.7%	10	1.0%	10	0.9%	14	1.1%	20	1.2%	19	1.2%
France	18	2.3%	27	2.8%	27	2.7%	37	3.2%	34	2.6%	31	2.0%	45	2.8%
Italy	34	4.5%	44	4.6%	42	4.1%	43	3.7%	46	3.4%	57	3.6%	49	3.0%
Other E.C.	32	4.2%	39	4.1%	46	4.6%	44	3.8%	57	4.3%	48	3.1%	48	3.0%
Total E.C.	259	34.3%	296	31.0%	309	30.7%	339	29.0%	377	28.4%	424	27.0%	442	27.1%
Other Developed	25	3.4%	36	3.8%	37	3.7%	44	3.8%	46	3.5%	53	3.3%	56	3.4%
Total Developed	570	75.6%	712	74.5%	751	74.5%	873	74.6%	987	74.3%	1,162	73.8%	1,193	73.2%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other OPEC	0	0.0%	0	0.0%	1	0.1%	0	0.0%	0	0.0%	1	0.1%	2	0.1%
Total OPEC	0	0.0%	0	0.0%	1	0.1%	0	0.0%	0	0.0%	1	0.1%	2	0.1%
Brazil	7	0.9%	13	1.4%	13	1.3%	13	1.1%	13	1.0%	29	1.8%	20	1.3%
Mexico	15	2.0%	23	2.4%	32	3.2%	45	3.9%	49	3.7%	57	3.6%	59	3.6%
Other Latin America	8	1.0%	8	0.8%	9	0.9%	10	0.8%	12	0.9%	12	0.8%	29	1.8%
Total Latin America	29	3.9%	44	4.6%	55	5.4%	68	5.8%	74	5.6%	98	6.2%	108	6.6%
South Korea	8	1.1%	17	1.8%	24	2.4%	39	3.3%	49	3.7%	79	5.0%	74	4.5%
Singapore	0	0.0%	0	0.0%	1	0.1%	2	0.2%	3	0.2%	3	0.2%	6	0.4%
Taiwan	130	17.2%	152	16.0%	144	14.2%	152	13.0%	173	13.0%	184	11.7%	195	12.0%
Other Asian NICS	2	0.3%	3	0.3%	3	0.3%	3	0.3%	3	0.2%	3	0.2%	2	0.1%
Total Asian NICS	140	18.6%	173	18.1%	171	17.0%	196	16.8%	228	17.1%	268	17.0%	276	16.9%
Other Developing Countries	13	1.7%	24	2.5%	29	2.9%	32	2.7%	37	2.8%	44	2.8%	50	3.1%
Total Developing Countries	183	24.3%	242	25.3%	257	25.4%	296	25.3%	338	25.5%	411	26.1%	435	26.7%
China	0	0.0%	0	0.0%	0	0.0%	1	0.1%	1	0.1%	1	0.1%	1	0.0%
USSR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Eastern Europe	1	0.1%	1	0.1%	1	0.1%	1	0.1%	1	0.1%	1	0.1%	1	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	1	0.1%	1	0.1%	1	0.1%	2	0.1%	2	0.2%	2	0.1%	2	0.1%
World	754	100.0%	956	100.0%	1,009	100.0%	1,171	100.0%	1,327	100.0%	1,574	100.0%	1,629	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.29
TRADE BALANCE (MILLION DOLLARS)
SITC 58 PLASTICS IN NON-PRIMARY FORMS

Item/Year	1983	1984	1985	1986	1987	1988	1989
Canada	177	153	108	66	133	99	77
Japan	-40	-80	-106	-152	-161	-176	-151
United Kingdom	3	20	16	26	14	15	43
West Germany	-49	-48	-53	-40	-51	-37	-89
Netherlands	19	19	23	33	37	43	67
France	23	15	12	4	16	20	15
Italy	-20	-27	-23	-24	-22	-29	-2
Other E.C.	73	83	53	64	75	83	140
Total E.C.	48	62	29	63	69	95	174
Other Developed	90	98	74	83	96	111	140
Total Developed	276	234	105	59	138	128	239
Saudi Arabia	42	24	16	9	10	15	18
Other OPEC	41	46	26	25	26	29	41
Total OPEC	83	70	42	34	36	44	59
Brazil	10	9	7	15	8	0	13
Mexico	56	80	104	100	136	221	222
Other Latin America	102	105	75	80	83	90	84
Total Latin America	168	194	186	195	226	310	320
South Korea	3	-1	-13	-25	-25	-38	-26
Singapore	13	14	15	13	16	22	52
Taiwan	-120	-142	-133	-133	-144	-146	-154
Other Asian NICS	12	10	12	16	23	49	42
Total Asian NICS	-93	-118	-120	-129	-130	-114	-85
Other Developing Countries	20	13	-2	0	0	2	-1
Total Developing Countries	152	126	88	85	115	222	281
China	1	2	3	3	15	20	16
USSR	64	57	66	59	65	55	37
Eastern Europe	1	0	2	9	0	1	0
Other CPE	0	0	0	0	0	0	0
Total CPE	65	59	70	72	80	76	52
World	493	419	263	216	333	426	572

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.30
EXPORTS BY COUNTRY (MILLION DOLLARS)
SITC 59 CHEMICAL MATERIALS AND PRODUCTS NOT ELSEWHERE SPECIFIED

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	392	15.0%	464	16.3%	444	17.2%	394	14.4%	461	14.8%	567	15.2%	694	15.1%
Japan	254	9.7%	273	9.6%	289	11.2%	293	10.7%	307	9.9%	358	9.6%	536	11.7%
United Kingdom	96	3.7%	100	3.5%	101	3.9%	103	3.8%	153	4.9%	196	5.3%	224	4.9%
West Germany	73	2.8%	84	3.0%	84	3.3%	95	3.5%	95	3.0%	125	3.4%	147	3.2%
Netherlands	133	5.1%	122	4.3%	102	4.0%	122	4.5%	144	4.6%	180	4.8%	179	3.9%
France	78	3.0%	69	2.4%	82	3.2%	95	3.5%	124	4.0%	161	4.3%	199	4.4%
Italy	34	1.3%	38	1.4%	37	1.4%	50	1.8%	44	1.4%	57	1.5%	65	1.4%
Other E.C.	257	9.9%	272	9.5%	272	10.5%	347	12.6%	384	12.3%	448	12.0%	490	10.7%
Total E.C.	637	24.4%	646	22.7%	641	24.8%	763	27.8%	899	28.8%	1,110	29.8%	1,239	27.0%
Other Developed	254	9.7%	313	11.0%	213	8.3%	238	8.7%	287	9.2%	343	9.2%	430	9.4%
Total Developed	1,537	58.9%	1,696	59.5%	1,586	61.5%	1,689	61.6%	1,955	62.7%	2,378	63.8%	2,899	63.3%
Saudi Arabia	53	2.0%	52	1.8%	37	1.4%	39	1.4%	54	1.7%	44	1.2%	51	1.1%
Other OPEC	147	5.6%	175	6.1%	171	6.6%	156	5.7%	177	5.7%	206	5.5%	225	4.9%
Total OPEC	199	7.6%	227	8.0%	208	8.1%	195	7.1%	231	7.4%	250	6.7%	276	6.0%
Brazil	110	4.2%	86	3.0%	73	2.8%	103	3.8%	84	2.7%	96	2.6%	106	2.3%
Mexico	83	3.2%	98	3.4%	109	4.2%	103	3.8%	104	3.3%	130	3.5%	208	4.5%
Other Latin America	328	12.6%	382	13.4%	318	12.3%	347	12.7%	368	11.8%	399	10.7%	474	10.3%
Total Latin America	520	19.9%	567	19.9%	500	19.4%	554	20.2%	556	17.8%	625	16.8%	788	17.2%
South Korea	46	1.7%	46	1.6%	36	1.4%	52	1.9%	58	1.9%	80	2.1%	167	3.7%
Singapore	97	3.7%	113	4.0%	95	3.7%	99	3.6%	121	3.9%	123	3.3%	156	3.4%
Taiwan	42	1.6%	39	1.4%	32	1.2%	41	1.5%	57	1.8%	60	1.6%	95	2.1%
Other Asian NICS	22	0.8%	31	1.1%	24	0.9%	24	0.9%	45	1.5%	59	1.6%	38	0.8%
Total Asian NICS	206	7.9%	229	8.0%	187	7.3%	216	7.9%	282	9.0%	322	8.6%	455	9.9%
Other Developing Countries	157	6.0%	191	6.7%	139	5.4%	140	5.1%	160	5.1%	197	5.3%	223	4.9%
Total Developing Countries	1,014	38.9%	1,101	38.6%	943	36.5%	1,002	36.5%	1,110	35.6%	1,274	34.2%	1,633	35.6%
China	37	1.4%	20	0.7%	23	0.9%	24	0.9%	29	0.9%	40	1.1%	37	0.8%
USSR	6	0.2%	8	0.3%	10	0.4%	8	0.3%	8	0.3%	19	0.5%	9	0.2%
Eastern Europe	7	0.3%	14	0.5%	10	0.4%	9	0.3%	6	0.2%	8	0.2%	5	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	50	1.9%	42	1.5%	43	1.7%	41	1.5%	44	1.4%	66	1.8%	51	1.1%
World	2,608	100.0%	2,849	100.0%	2,581	100.0%	2,742	100.0%	3,118	100.0%	3,725	100.0%	4,583	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.31
IMPORTS BY COUNTRY (MILLION DOLLARS)
SITC 59 CHEMICAL MATERIALS AND PRODUCTS NOT ELSEWHERE SPECIFIED

Item/Year	1983		1984		1985		1986		1987		1988		1989	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	101	10.5%	117	10.1%	126	9.1%	144	11.1%	166	11.7%	172	10.3%	201	11.3%
Japan	107	11.1%	143	12.3%	148	10.7%	193	14.9%	235	16.5%	301	18.1%	197	11.1%
United Kingdom	51	5.3%	58	5.0%	80	5.8%	96	7.4%	105	7.4%	119	7.2%	161	9.0%
West Germany	96	10.0%	126	10.9%	121	8.7%	148	11.4%	205	14.4%	235	14.1%	295	16.6%
Netherlands	36	3.7%	43	3.7%	51	3.7%	62	4.8%	62	4.3%	72	4.3%	97	5.5%
France	53	5.6%	57	4.9%	56	4.0%	75	5.8%	88	6.2%	114	6.8%	118	6.6%
Italy	12	1.3%	29	2.5%	25	1.8%	29	2.2%	32	2.3%	29	1.8%	33	1.9%
Other E.C.	71	7.4%	78	6.8%	115	8.3%	110	8.5%	138	9.7%	176	10.6%	215	12.1%
Total E.C.	319	33.1%	392	33.9%	446	32.2%	520	40.1%	631	44.3%	746	44.8%	918	51.6%
Other Developed	167	17.4%	182	15.7%	190	13.7%	187	14.4%	181	12.7%	191	11.4%	223	12.6%
Total Developed	693	72.0%	833	72.1%	910	65.7%	1,044	80.5%	1,213	85.1%	1,409	84.6%	1,540	86.5%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other OPEC	137	14.2%	2	0.2%	6	0.4%	9	0.7%	7	0.5%	20	1.2%	1	0.1%
Total OPEC	137	14.2%	2	0.2%	6	0.4%	9	0.7%	7	0.5%	20	1.2%	1	0.1%
Brazil	11	1.1%	19	1.7%	97	7.0%	24	1.9%	20	1.4%	31	1.9%	27	1.5%
Mexico	6	0.6%	145	12.5%	138	10.0%	19	1.5%	13	0.9%	17	1.0%	28	1.5%
Other Latin America	157	16.3%	23	2.0%	35	2.5%	35	2.7%	29	2.0%	48	2.9%	21	1.2%
Total Latin America	173	18.0%	188	16.2%	270	19.5%	79	6.1%	62	4.3%	96	5.8%	75	4.2%
South Korea	1	0.1%	3	0.3%	1	0.1%	7	0.5%	7	0.5%	4	0.2%	2	0.1%
Singapore	1	0.1%	3	0.2%	2	0.1%	1	0.1%	0	0.0%	3	0.2%	0	0.0%
Taiwan	6	0.6%	7	0.6%	11	0.8%	9	0.7%	8	0.6%	10	0.6%	11	0.6%
Other Asian NICS	3	0.3%	4	0.4%	6	0.5%	9	0.7%	11	0.7%	10	0.6%	6	0.3%
Total Asian NICS	11	1.1%	17	1.5%	20	1.5%	25	1.9%	27	1.9%	26	1.6%	19	1.0%
Other Developing Countries	34	3.5%	74	6.4%	63	4.5%	51	3.9%	51	3.6%	60	3.6%	73	4.1%
Total Developing Countries	226	23.5%	280	24.2%	356	25.7%	156	12.0%	141	9.9%	183	11.0%	167	9.4%
China	38	4.0%	39	3.3%	45	3.3%	52	4.0%	60	4.2%	54	3.2%	60	3.4%
USSR	1	0.1%	0	0.0%	0	0.0%	1	0.0%	0	0.0%	1	0.0%	0	0.0%
Eastern Europe	4	0.4%	4	0.4%	74	5.4%	45	3.5%	10	0.7%	18	1.1%	11	0.7%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	43	4.5%	43	3.7%	119	8.6%	98	7.5%	71	5.0%	73	4.4%	72	4.1%
World	962	100.0%	1,156	100.0%	1,385	100.0%	1,298	100.0%	1,425	100.0%	1,665	100.0%	1,780	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.32
TRADE BALANCE (MILLION DOLLARS)
SITC 59 CHEMICAL MATERIALS AND PRODUCTS NOT ELSEWHERE SPECIFIED

Item/Year	1983	1984	1985	1986	1987	1988	1989
Canada	291	347	318	250	295	395	492
Japan	147	130	141	100	72	57	339
United Kingdom	46	42	21	8	48	77	63
West Germany	-23	-42	-37	-52	-111	-110	-148
Netherlands	97	79	51	60	82	108	82
France	24	12	26	20	36	47	81
Italy	22	10	12	21	12	28	32
Other E.C.	152	155	120	186	202	214	210
Total E.C.	318	254	194	243	269	365	320
Other Developed	87	131	24	51	106	153	207
Total Developed	843	863	676	644	742	969	1359
Saudi Arabia	53	52	37	39	54	44	51
Other OPEC	10	173	166	148	170	186	224
Total OPEC	63	225	203	187	224	231	275
Brazil	99	67	-24	79	64	65	79
Mexico	76	-47	-29	84	91	112	180
Other Latin America	171	359	284	312	339	351	454
Total Latin America	347	379	231	475	494	528	713
South Korea	45	43	35	45	51	76	165
Singapore	95	110	93	99	121	120	155
Taiwan	36	32	21	32	49	50	84
Other Asian NICS	19	27	18	16	35	50	32
Total Asian NICS	195	212	167	191	255	296	437
Other Developing Countries	124	117	76	89	109	137,	150
Total Developing Countries	788	822	587	846	969	1091	1466
China	-1	-18	-22	-28	-31	-13	-23
USSR	5	8	10	7	8	18	8
Eastern Europe	3	10	-64	-37	-4	-11	-6
Other CPE	0	0	0	0	0	0	0
Total CPE	7	-1	-76	-57	-27	-6	-21
World	1646	1693	1196	1444	1693	2060	2803

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

Section 4
Research And Development

The U.S. chemical industry has been one of the largest investors in research and development (R&D). New products and processes are the driving force of continued international competitiveness of the U.S. chemical industry. About 75,000 chemists, other scientists, engineers, and technicians are engaged constantly in developing new and better process technologies, new chemical compounds and products, and new applications for existing chemical products.

Prior to World War I, only three patents out of every 100 issued by the U.S. Patent Office were in the field of chemicals. In the 1980s, chemical patents accounted for about 15 percent of each year's total. This intense research is engendering dividends to the industry as well as to society as a whole. The payoff is in a rapid rate of technological innovation that is evidenced in a constant stream of new products and production processes.

There are two broad categories of research: basic and applied. Basic (or fundamental) research can be defined as any planned searc' for unknown facts and principles of general validity without regard to commercial objectives. Applied research on the other hand, is an investigation made for a specific practical objective. It has been defined as any planned investigation with the intent of utilizing known phenomena or substances to accomplish a particular objective. In general, the basic research of today is the foundation for tomorrow's applied research, which uses known facts to develop new processes or products.

Organized industrial research in the chemical industry did not begin until about 1900. Problems that arose during World War I gave new emphasis to research and marked the start of sizable programs. Since then, the industry's R&D effort has continued to expand, with spending reaching $11.9 billion in 1989. Today, most companies allocate 4 to 6 percent of their annual sales for R&D.

Most successful research in the chemical industry is accomplished only after intensive effort and major expenditures. Typically , it takes four to eight years from the time a project is conceived to the time a chemical product is commercialized in the marketplace. For each project that successfully leads to a practical application, many are undertaken that are unsuccessful. For each success in the marketplace, there may be as many as one hundred failures. The successes must yield enough in profits to provide an adequate return on the total investment in R&D, including the many projects that prove unsuccessful.

Spurred by international competition, chemical industry research and development spending steadily expanded in the 1980's.

Chart 4.1

Chemical Industry R+D Funding

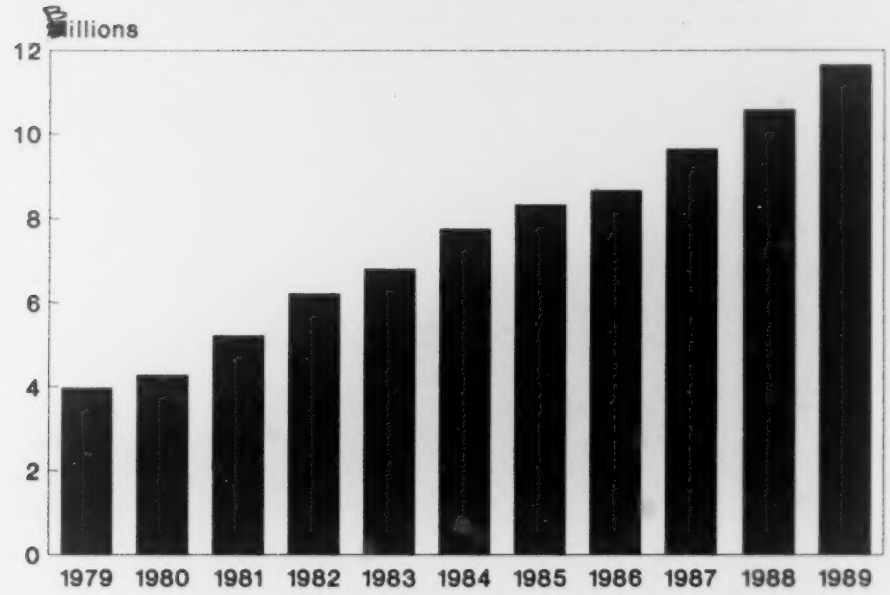


TABLE 4.1
RESEARCH AND DEVELOPMENT FUNDING (MILLION DOLLARS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	17362	23452	36686	42689	49904	56509	62273	70962	78523	82026	87562	92725	96575	10.2%	6.4%	4.2%
Company Funds	10063	15157	24849	29439	34380	38970	42854	49225	53635	56463	58990	62700	65435	10.2%	5.9%	4.4%
Federal Contracts	7299	8295	11837	13250	15524	17539	19419	21737	24888	25563	28572	30025	31140	10.2%	7.5%	3.7%
Chemicals & Allied Products	1773	2727	4038	4636	5625	6604	7185	7927	8540	8837	9831	10770	11850	11.4%	8.4%	10.0%
Company Funds	1593	2490	3692	4264	5205	6197	6792	7736	8310	8656	9638	10565	11640	12.2%	8.5%	10.2%
Federal Contracts	180	236	346	372	421	407	393	191	230	181	193	205	210	-4.9%	1.9%	2.4%

Source: National Science Foundation
1988 and 1989 data are CMA estimates based on NSF data

TABLE 4.2
PATENTS GRANTED IN THE UNITED STATES (NUMBER GRANTED)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	64305	71925	48849	61807	65760	57881	56853	67183	71647	70779	82861	77792	94936	6.9%	7.2%	22.0%
United States	46982	46661	30076	37348	39216	33891	32865	38357	39548	38082	43460	40411	49854	5.2%	5.4%	23.4%
Other Nations	17323	25264	18773	24459	26544	23990	23988	28826	32099	32697	39401	37381	45082	9.2%	9.4%	20.6%
Chemical & Allied Products	8803	11867	7973	9829	10797	9088	8856	9887	10250	9244	10295	10091	12678	4.7%	5.1%	25.6%
By Nation:																
United States	5843	6899	4564	5459	6001	4933	4895	5513	5515	4897	5376	5178	6379	3.4%	3.0%	23.2%
Other Nations	2960	4968	3409	4370	4796	4155	3961	4374	4735	4347	4919	4913	6299	6.3%	7.6%	28.2%
By Segment:																
Industrial Inorganic Chemicals	893	1226	912	1093	1296	1019	1107	1185	1191	1042	1160	1026	1253	3.2%	1.1%	22.1%
Plastic Materials and Synthetics	1146	989	781	965	1089	925	1072	1053	1155	968	1116	1114	1373	5.8%	5.5%	23.2%
Drugs	498	1069	1020	1378	1430	1270	1126	1406	1407	1426	1748	1750	2352	8.7%	10.8%	34.4%
Soaps, Cleaners, and Toilet Goods	244	355	369	388	461	355	393	455	473	405	463	500	695	6.5%	8.8%	39.0%
Paints and Allied Products	388	568	397	457	505	405	429	461	472	360	413	396	462	1.5%	0.0%	16.7%
Industrial Organic Chemicals	4671	6181	3169	3863	4292	3471	3041	3421	3504	3220	3366	3259	3994	2.3%	3.1%	22.6%
Agricultural Chemicals	399	772	879	1120	1097	1044	992	1170	1245	1219	1348	1373	1861	7.8%	9.7%	35.5%
Miscellaneous Chemical Products	565	707	448	566	627	599	697	738	804	606	681	673	689	4.4%	-1.4%	2.4%

Source: Patent and Trademark Office

Section 5
Investment

The nature of chemical production, which lends itself to a high degree of automation, engenders prodigious capital requirements. These high capital costs reflect the large capacity that is needed to obtain economies of scale in the production of many chemicals, the intricate nature of the equipment and processes used, the large amounts of equipment needed, the high level of technology required, and the rapid technological obsolescence and depreciation of process plants. Indeed, the amount of capital stocks per employee in the chemical industry — $119,200 in 1989 — was about twice that for U.S. manufacturing as a whole.

New capital requirements include not only extensive investment for new capacity but also for continual upgrading and replacement of existing plants to remain competitive and protect the environment. Complete modernization programs that utilize the latest process technologies, often for "debottlenecking" (i.e., maximizing throughput) are often required. A long lead time is required for funding, designing, and completing chemical industry capital spending programs. This makes short-run adjustments difficult as capital spending cannot easily be turned on and off. Given its capital intensive nature, however, the industry is highly sensitive to the costs of capital.

Following the recession of the early-1980's, chemical industry expenditures for new plant & equipment increased 55 percent.

Chart 5.1

Chemical Industry P&E Expenditures

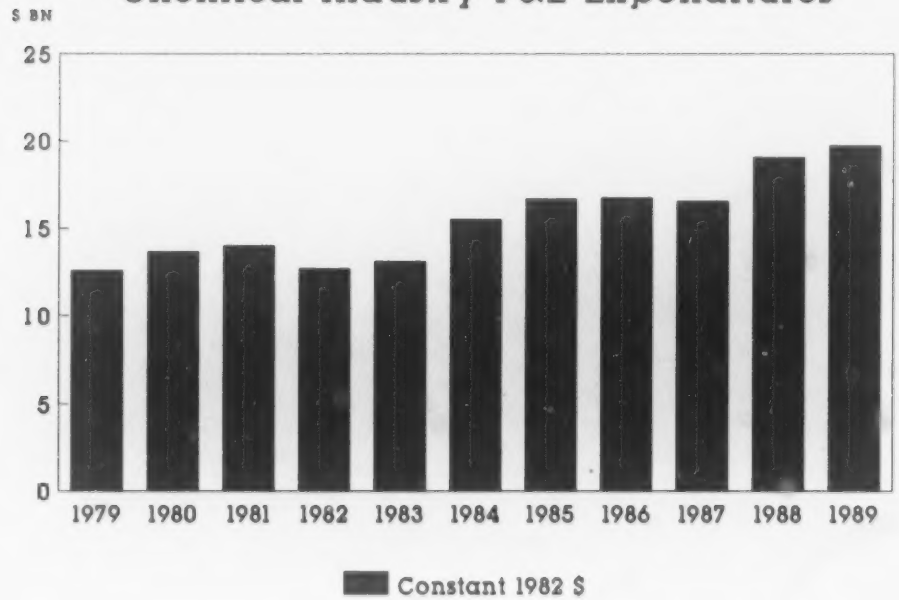


TABLE 5.1
NEW PLANT AND EQUIPMENT EXPENDITURES

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
New Plant & Equipment Expenditures (billion 1982 dollars)																
Manufacturing	97.24	97.05	124.57	132.99	135.62	120.67	119.10	143.61	158.88	145.00	149.87	167.35	181.90	3.9%	4.8%	8.7%
Chemicals & Allied Products	8.78	12.43	12.58	13.63	13.96	12.65	13.06	15.49	16.66	16.74	16.53	19.07	19.72	4.6%	4.9%	3.4%
New Plant & Equipment Expenditures (billion dollars)																
Manufacturing	36.99	53.66	95.92	112.33	126.54	120.67	116.20	138.83	153.49	142.74	145.45	165.67	184.54	6.8%	5.9%	11.4%
Chemicals & Allied Products	3.38	7.12	9.80	11.63	13.11	12.66	12.96	15.32	16.44	16.74	16.36	19.24	20.35	7.6%	5.8%	5.8%
Capital Expenditures by Majority-Owned Affiliates of U.S. Companies																
Manufacturing	n/a	n/a	15.42	19.54	19.16	16.65	13.56	13.62	14.92	16.39	17.16	20.40	23.42	4.3%	11.5%	14.8%
Chemicals & Allied Products	n/a	n/a	2.59	2.97	2.97	3.35	2.32	2.39	2.74	3.06	3.74	4.71	5.29	7.4%	17.2%	12.3%

Source: Bureau of Economic Analysis (data are on a company basis)

TABLE 5.2
CAPITAL EXPENDITURES (MILLION DOLLARS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	22204	37245	61498	70126	78737	74562	62123	74548	83059	76355	78907	90330	100605	5.0%	6.2%	11.4%
Chemicals & Allied Products	3061	6353	7976	8770	9471	9087	7083	7475	8181	7907	8712	10045	10710	3.0%	7.5%	6.6%
Industrial Inorganic Chemicals	406	721	962	1020	1112	1000	820	985	1039	812	794	945	975	0.1%	-0.2%	3.2%
Plastics Materials & Synthetics	655	1440	1676	2064	1606	1677	1160	1260	1630	1898	1902	2400	2535	4.2%	15.0%	5.6%
Drugs	331	475	809	902	1047	1248	1191	1433	1467	1331	1749	1930	2055	9.8%	7.5%	6.5%
Soaps, Cleaners & Toilet Goods	225	255	488	534	562	650	631	714	762	742	785	850	890	6.2%	4.5%	4.7%
Paints & Allied Products	112	122	187	205	231	219	280	284	249	254	275	305	320	5.5%	2.4%	4.9%
Industrial Organic Chemicals	1030	2120	2880	2938	3275	3075	2380	1906	2021	1843	2401	2675	2950	0.2%	9.1%	10.3%
Agricultural Chemicals	147	960	608	709	1141	699	331	449	508	523	361	425	450	-3.0%	0.1%	5.9%
Miscellaneous Chemical Products	155	261	367	399	497	519	290	444	504	505	446	515	535	3.8%	3.8%	3.9%

Source: Bureau of the Census (data are on an industry basis)
1988 and 1989 Data are CMA estimates based on BEA and ITA data

Reflecting higher construction costs and mandated expenditures for pollution abatement and control, the productivity of capital declined.

Chart 5.2
Capital Productivity
(1987=100)

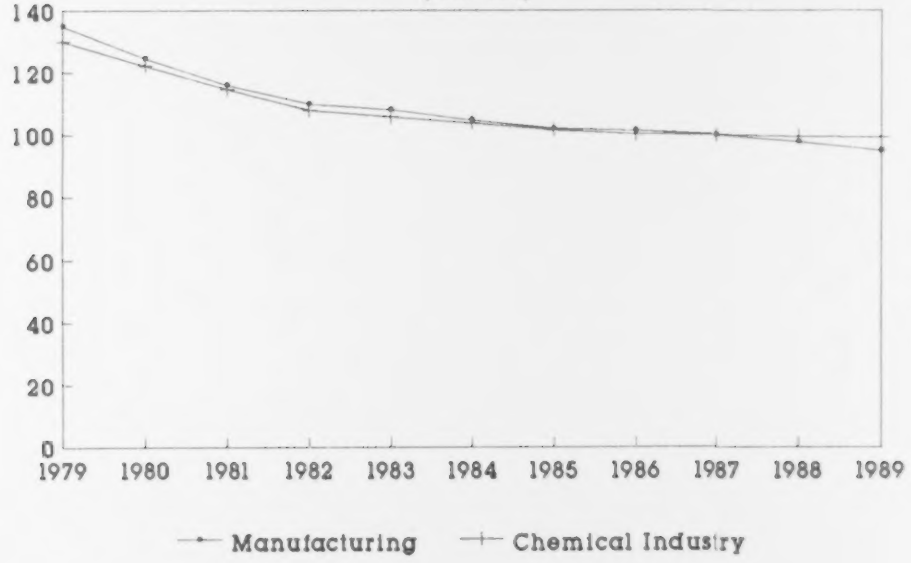


TABLE 5.3
CAPITAL STOCKS AND PRODUCTIVITY

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Gross Capital Stocks (billion dollars)																
Manufacturing	254.91	368.19	540.30	602.34	669.93	732.12	778.68	835.27	896.67	948.76	1000.54	1059.14	1125.78	7.6%	6.2%	6.3%
Chemicals & Allied Products	31.85	47.90	73.92	81.18	88.82	96.44	101.33	106.35	111.55	116.05	120.01	125.02	130.24	5.8%	4.1%	4.2%
Net Capital Stocks (billion dollars)																
Manufacturing	164.83	236.21	354.35	397.86	444.06	482.73	504.39	535.54	570.38	595.09	619.68	651.37	690.65	6.9%	5.2%	6.0%
Chemicals & Allied Products	20.56	31.19	48.64	53.04	57.57	61.93	63.62	65.56	67.79	69.42	70.71	73.22	76.06	4.6%	3.0%	3.9%
Capacity (1987=100)																
Manufacturing	57.7	68.1	77.1	80.0	83.1	85.7	87.9	90.5	93.8	97.2	100.0	102.7	105.7	3.2%	3.2%	2.9%
Chemicals & Allied Products	58.9	77.1	89.4	91.6	93.4	94.5	95.1	96.1	97.3	98.3	100.0	102.9	106.7	1.8%	2.1%	3.7%
Average Age of Gross Capital Stocks (years)																
Manufacturing	7.84	7.91	7.43	7.27	7.15	7.16	7.35	7.46	7.54	7.72	7.90	8.01	8.08	0.8%	1.6%	0.9%
Chemicals & Allied Products	7.35	7.20	6.74	6.76	6.81	6.88	7.14	7.37	7.58	7.81	8.06	8.21	8.34	2.2%	2.5%	1.6%
Average Age of Net Capital Stocks (years)																
Manufacturing	5.61	5.64	5.20	5.08	5.01	5.06	5.30	5.41	5.49	5.66	5.81	5.88	5.89	1.3%	1.7%	0.2%
Chemicals & Allied Products	5.21	5.06	4.80	4.86	4.92	5.00	5.28	5.50	5.68	5.88	6.08	6.16	6.21	2.6%	2.5%	0.8%
Capital Productivity (1987=100)																
Manufacturing	217.1	178.6	134.9	124.6	115.9	110.0	108.0	104.7	101.9	101.2	100.0	97.7	94.8	-3.5%	-2.0%	-3.0%
Chemical & Allied Products	202.5	174.8	130.0	122.1	114.7	107.9	105.7	103.6	101.5	100.1	100.0	99.4	99.2	-2.7%	-0.9%	-0.2%

Source: Bureau of Economic Analysis, Federal Reserve Board, CMA analysis
Capital Productivity is capacity relative to net capital stocks

Since the early-1980's, the U.S. chemical industry has become more global in scope.

Chart 5.3

Chemical Industry Direct Investment

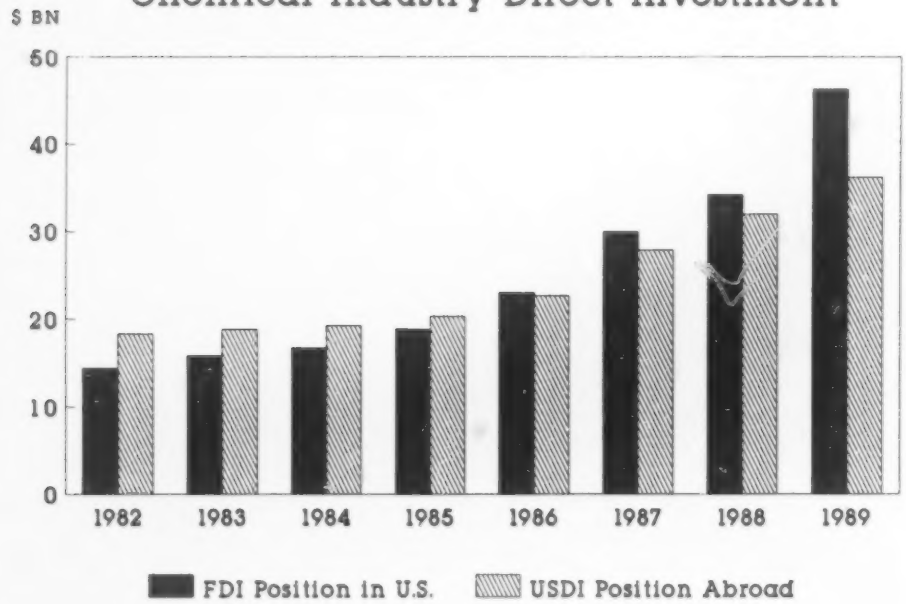


TABLE 5.4
INTERNATIONAL DIRECT INVESTMENT (BILLION DOLLARS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Foreign Direct Investment Position in the United States																
Manufacturing	n/a	n/a	n/a	n/a	n/a	44.07	47.67	51.80	59.58	71.96	94.75	121.43	160.22		25.3%	31.9%
Chemicals & Allied Products	n/a	n/a	n/a	n/a	n/a	14.38	15.78	16.63	18.84	22.95	29.94	34.15	46.27		22.7%	35.5%
Foreign Direct Investment in the United States: Capital Inflows																
Manufacturing	n/a	n/a	n/a	n/a	n/a	2.74	3.54	3.99	8.05	11.87	23.37	28.23	38.88		57.7%	37.7%
Chemicals & Allied Products	n/a	n/a	n/a	n/a	n/a	0.68	1.39	0.83	1.95	4.11	7.86	4.52	12.03		70.7%	166.2%
U.S. Direct Investment Position Abroad																
Manufacturing	n/a	n/a	n/a	n/a	n/a	83.45	82.91	85.87	94.70	105.10	131.65	139.58	155.70		12.6%	11.5%
Chemcials & Allied Products	n/a	n/a	n/a	n/a	n/a	18.27	18.79	19.20	20.27	22.65	27.79	31.92	36.16		13.5%	13.3%
U.S. Direct Investment Abroad: Capital Outlays																
Manufacturing	n/a	n/a	n/a	n/a	n/a	1.77	-0.78	1.86	9.04	10.08	13.26	7.66	12.82		47.1%	67.4%
Chemicals & Allied Products	n/a	n/a	n/a	n/a	n/a	0.55	0.12	0.24	0.78	2.25	3.20	3.86	4.20		77.3%	8.8%

Source: Bureau of Economic Analysis

Section 6
Employment and Labor

The chemical industry is one of the most intensive consumers of capital and energy and one of the least intensive users of labor. Capital stocks per employee in the chemical industry — $119,200 in 1989 — are among the highest in American manufacturing (which averaged $57,400 per employee in 1989). Employing 1,092,900 workers in 1989, the chemical industry, nonetheless, is one of the largest U.S. industries in terms of employment. Since World War II Growth in the chemical industry has been accompanied by expanding employment and significant gains in labor productivity (i.e., output per manhour).

Because of the highly varied and technical nature of its operations and products, the role of research and development (R&D) and technical servicing with customers is critical. This, together with continuing increased automation of production processes, has caused the production worker's portion of the industry workforce to decline modestly over the years. Production worker employment was over 613,000 in 1989, 56 percent of the total (as compared with 68 percent for manufacturing as a whole).

Thus, four out of every ten employees in chemicals are in administration, sales, technical servicing, R&D, and clerical positions. The industry employs some 75,000 scientists and engineers in R&D alone. This represents about 7 percent of total chemical industry employment and over 10 percent of total R&D employment of scientists and engineers in the United States.

The increasingly complex nature of the chemical industry requires new and more highly developed skills, and better trained and educated workers. In plant operations, this has resulted in making technicians out of skilled workers and skilled workers out of unskilled workers. In other areas, the need for chemists, chemical engineers, and other technically trained personnel (from agronomists to toxicologists to zoologists) continues to mount. The need for more technical production line skills and the increasing productivity of chemical industry workers has resulted in the chemical industry paying hourly production wages that are 25 percent to 30 percent greater than those paid in manufacturing as a whole.

After a long period of restructuring, employment in the U.S. chemical industry increased steadily after 1986.

Chart 6.1

Chemical Industry Employment

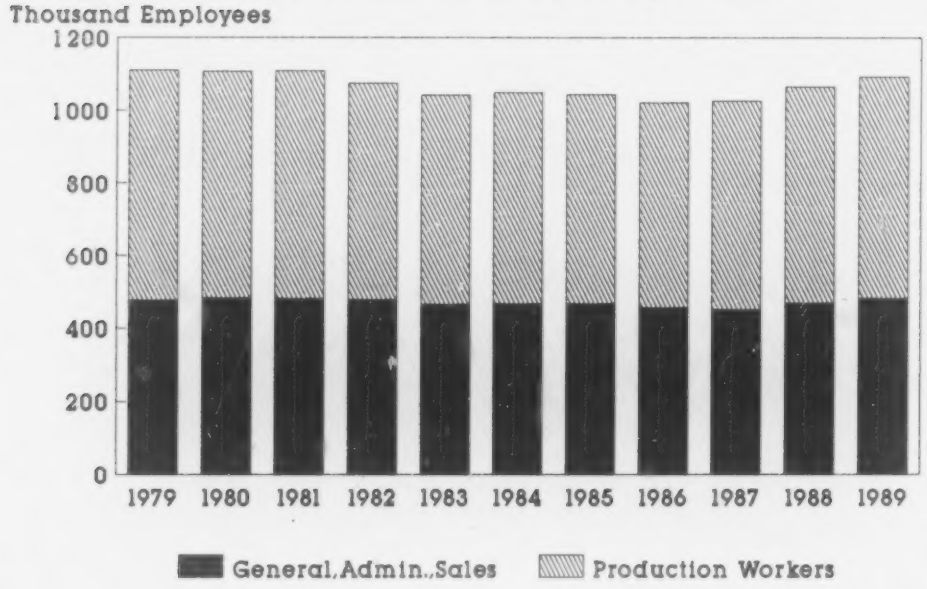


TABLE 6.1
EMPLOYMENT (THOUSANDS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	19366	18323	21040	20285	20170	18781	18434	19378	19260	18965	19024	19403	19612	-0.7%	0.2%	1.1%
Chemicals & Allied Products	1,049.3	1,014.7	1,109.3	1,107.4	1,109.0	1,075.1	1,042.8	1,049.4	1,044.1	1,021.8	1,025.9	1,064.5	1,092.9	-0.1%	0.8%	2.7%
Industrial Inorganic Chemicals	n/a	148.7	162.1	161.1	161.9	160.8	150.6	142.8	142.3	135.2	130.4	133.1	134.8	-1.8%	-1.1%	1.3%
Plastics Materials and Synthetics	232.5	218.4	212.2	204.8	196.0	184.7	176.5	177.8	172.1	167.6	168.2	177.8	186.8	-1.3%	1.0%	5.1%
Industrial Organic Chemicals	n/a	149.5	171.4	174.1	177.8	170.8	163.1	162.4	160.1	154.4	148.3	146.5	150.2	-1.3%	-1.5%	2.6%
Agricultural Chemicals	n/a	65.3	70.2	72.0	70.4	65.3	60.5	60.6	58.8	54.0	51.4	52.1	53.3	-2.7%	-2.5%	2.3%

Source: Bureau of Labor Statistics

TABLE 6.2
EMPLOYMENT - PRODUCTION WORKERS (THOUSANDS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	14045	13043	15068	14214	14020	12742	12530	13285	13092	12877	12970	13254	13375	-1.2%	0.1%	0.9%
Chemicals & Allied Products	604.0	579.6	633.3	625.8	628.3	598.6	578.6	583.0	577.8	568.0	575.3	596.3	613.3	-0.3%	1.0%	2.9%
Industrial Inorganic Chemicals	n/a	89.8	88.0	87.4	88.3	85.6	76.9	72.7	72.1	69.2	67.1	66.8	69.4	-2.4%	-0.9%	3.8%
Plastics Materials and Synthetics	142.9	136.4	143.6	136.6	129.7	119.3	114.6	117.3	114.4	112.7	110.9	116.4	122.4	-1.6%	0.8%	5.1%
Industrial Organic Chemicals	n/a	74.5	88.8	88.2	89.7	85.9	83.7	82.5	81.6	81.3	83.2	84.7	87.8	-0.1%	1.2%	3.6%
Agricultural Chemicals	n/a	42.2	45.0	45.4	44.0	39.6	36.5	37.5	36.6	33.1	32.3	33.3	33.3	-3.0%	-2.4%	-0.2%

Source: Bureau of Labor Statistics

Weekly earnings in the chemical industry are consistently above those in manufacturing as a whole.

Chart 6.2

Weekly Earnings

Chemical Industry vs. Manufacturing

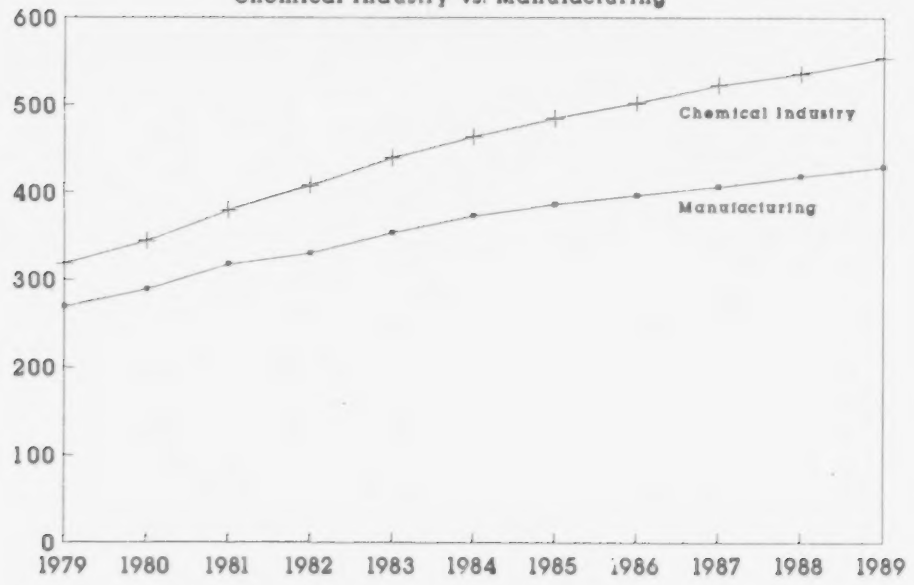


TABLE 6.3
AVERAGE HOURLY EARNINGS - PRODUCTION WORKERS

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	3.35	4.83	6.69	7.28	7.99	8.50	8.83	9.19	9.54	9.73	9.91	10.18	10.47	4.6%	2.7%	2.9%
Chemicals & Allied Products	3.69	5.39	7.60	8.31	9.12	9.97	10.58	11.07	11.57	11.98	12.37	12.66	13.06	5.6%	3.4%	3.1%
Industrial Inorganic Chemicals	n/a	5.73	8.27	9.08	10.16	11.02	11.66	12.30	12.80	13.11	13.56	13.87	14.21	5.6%	2.9%	2.4%
Plastics Materials and Synthetics	3.62	5.27	7.48	8.21	9.01	9.88	10.55	11.10	11.72	12.13	12.60	13.04	13.39	6.0%	3.8%	2.7%
Industrial Organic Chemicals	n/a	6.25	5.62	6.25	6.88	4.93	12.73	13.43	13.98	14.39	14.89	15.05	15.58	10.7%	3.0%	3.5%
Agricultural Chemicals	n/a	4.94	7.26	8.13	8.91	9.71	10.25	10.74	11.05	11.45	11.92	12.34	12.75	5.8%	3.5%	3.3%

Source: Bureau of Labor Statistics

TABLE 6.4
AVERAGE WEEKLY EARNINGS - PRODUCTION WORKERS

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	133.54	190.49	268.97	288.88	318.10	330.83	354.05	373.80	386.48	396.56	406.08	418.25	429.00	4.8%	2.8%	2.6%
Chemicals & Allied Products	153.52	220.79	318.19	344.43	379.24	407.50	439.96	464.07	484.62	502.17	523.18	536.10	554.09	5.7%	3.6%	3.4%
Industrial Inorganic Chemicals	n/a	237.40	347.96	376.72	422.11	445.55	483.84	518.11	533.26	551.11	574.98	595.80	608.16	5.7%	3.3%	2.1%
Plastics Materials and Synthetics	151.37	213.99	314.75	339.69	378.57	401.48	442.87	468.63	495.47	511.46	542.63	566.25	577.19	6.3%	4.3%	1.9%
Industrial Organic Chemicals	n/a	258.35	391.05	413.86	458.65	496.62	540.45	578.14	605.93	624.45	656.06	664.05	695.41	5.9%	3.8%	4.7%
Agricultural Chemicals	n/a	209.75	311.43	352.61	382.90	407.86	431.26	459.28	471.90	482.67	510.67	534.80	552.64	5.9%	3.8%	3.3%

Source: Bureau of Labor Statistics

Labor productivity in the U.S. chemical industry has improved significantly since 1979.

Chart 6.3

Labor Productivity

(1987=100)

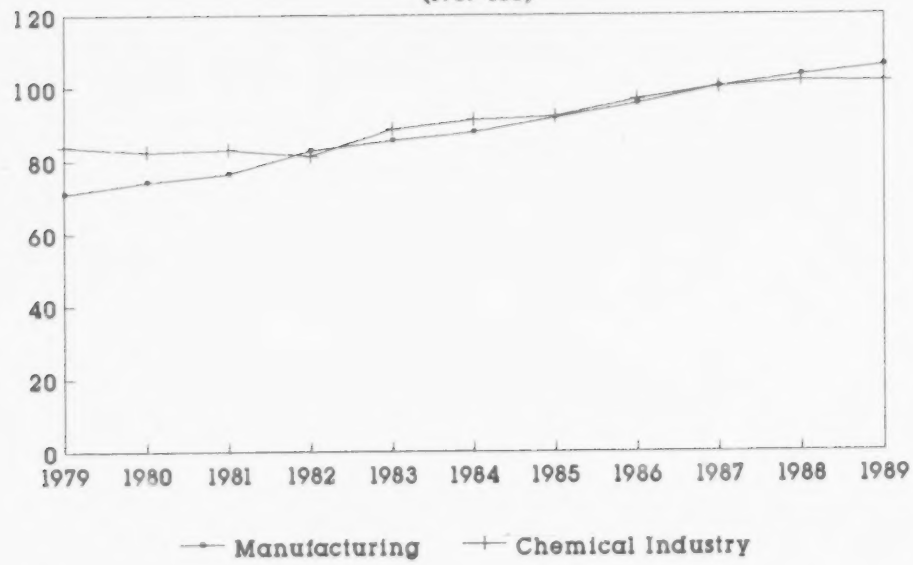


TABLE 6.5
AVERAGE WEEKLY HOURS - PRODUCTION WORKERS

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	39.8	39.5	40.2	39.7	39.8	38.9	40.1	40.7	40.5	40.7	41.0	41.1	41.0	0.2%	0.1%	-0.3%
Chemicals & Allied Products	41.6	41.0	41.9	41.5	41.6	40.9	41.6	41.9	41.9	41.9	42.3	42.3	42.4	0.1%	0.2%	0.2%
Industrial Inorganic Chemicals	n/a	41.4	42.1	41.5	41.6	40.4	41.5	42.1	41.7	42.0	42.4	43.0	42.8	0.2%	0.3%	-0.3%
Plastics Materials and Synthetics	41.8	40.6	42.1	41.4	42.0	40.6	42.0	42.2	42.3	42.2	43.1	43.4	43.1	0.2%	0.4%	-0.7%
Industrial Organic Chemicals	n/a	41.4	43.4	42.8	42.8	41.9	42.5	43.1	43.3	43.4	44.1	44.1	44.6	0.3%	0.7%	1.2%
Agricultural Chemicals	n/a	42.5	42.9	43.4	43.0	42.0	42.1	42.8	42.7	42.2	42.8	43.3	43.4	0.1%	0.3%	0.1%

Source: Bureau of Labor Statistics

TABLE 6.6
LABOR PRODUCTIVITY INDEX (1987=100)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	53.6	63.1	71.0	74.2	76.5	82.0	85.5	87.8	91.7	95.5	100.0	103.2	105.6	4.0%	3.8%	2.3%
Chemicals & Allied Products	54.2	70.8	83.9	82.4	83.1	81.3	88.5	91.1	91.9	96.7	100.0	101.6	101.5	1.9%	2.2%	-0.2%
Industrial Inorganic Chemicals	n/a	65.1	78.2	75.8	75.2	71.2	82.2	90.0	91.1	93.1	100.0	97.4	102.1	2.7%	2.6%	4.8%
Plastics Materials and Synthetics	31.5	47.3	67.8	60.2	69.7	70.7	83.7	85.7	85.8	92.1	100.0	98.6	93.3	3.3%	1.7%	-5.3%
Industrial Organic Chemicals	n/a	83.2	97.0	90.1	92.7	82.5	92.8	96.4	97.6	98.8	100.0	101.2	102.2	0.5%	1.2%	1.1%
Agricultural Chemicals	n/a	62.4	67.2	68.3	74.8	73.8	78.8	87.9	85.0	87.6	100.0	102.7	103.9	4.5%	3.4%	1.1%

Source: Bureau of Labor Statistics, Federal Reserve Board, CMA analysis

TABLE 6.7
UNIT LABOR COSTS (1987=100)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	61.3	74.3	93.3	95.8	102.4	99.3	101.9	104.8	103.8	102.3	100.0	99.8	100.0	0.7%	-0.9%	0.3%
Chemicals & Allied Products	54.1	59.6	72.5	79.9	87.3	95.8	95.0	97.4	100.8	99.3	100.0	100.8	104.4	3.7%	1.4%	3.5%
Industrial Inorganic Chemicals	n/a	63.5	77.4	86.5	97.7	108.9	102.4	100.1	101.8	102.9	100.0	106.3	103.6	3.0%	0.7%	-2.6%
Plastics Materials and Synthetics	88.4	83.3	85.6	104.0	100.1	104.6	97.5	100.8	106.5	102.3	100.0	105.8	114.0	2.9%	2.5%	7.7%
Industrial Organic Chemicals	n/a	47.3	61.5	70.0	75.4	91.8	88.7	91.4	94.6	96.3	100.0	100.0	103.7	5.4%	2.6%	3.6%
Agricultural Chemicals	n/a	65.9	90.8	101.1	100.3	108.2	107.2	102.3	108.7	107.8	100.0	101.9	104.2	1.4%	0.4%	2.2%

Source: Bureau of Labor Statistics, Federal Reserve Board, CMA analysis

Section 7
Health, Safety, and Environmental

The U.S. Chemical industry is subject to a wide variety of statutes and regulations designed to protect and improve the nation's health, safety and environment. These statutes and regulations very much affect the industry's products, processes, and production costs. The major laws are:

The Toxic Substances Control Act (TSCA) gives the Environmental Protection Agency the authority to regulate toxic substances. Among other requirements, it mandates that chemical companies submit premanufacture notices that that provide information on health and environmental effects for each new product and test existing products for these effects.

The Clean Air Act provides EPA authority to regulate air pollutants from automobiles, electric power plants, chemical plants and other industrial sources.

The Superfund Amendments and Reauthorization Act (SARA) of 1986 established "right to know" standards that require petroleum refineries, chemical plants, and other industrial facilities to provide information to the public about stored toxic substances and annual releases into the environment. Superfund also established a fund for cleaning up waste sites with revenue from a broad-based tax on the oil, chemical, and other industries.

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) provides EPA authority to register and assess risk on agricultural pesticides, industrial biocides, and other non-agricultural pesticides.

The Food, Drug and Cosmetics Act provides the Food and Drug Administration (FDA) authority to regulate the manufacturing of drugs and pharmaceuticals and the use of packaging and additives in food and cosmetics.

The Resource Conservation and Recovery Act (RCRA) provides EPA with authority to establish standards and regulations for handling and disposing of solid and hazardous wastes. The act also requires companies to establish programs to reduce the volume and toxicity of hazardous wastes.

Other acts that impact the chemical industry include: (1) the Occupational Safety and Health Act, which sets workplace safety and health standards. including permissable exposures to chemicals in the workplace; (2) the Clean Water Act, which provides EPA the authority to regulate effluents into waters; (3) the Safe Water Drinking Act, which provides EPA with authority to set standards protecting ground water quality around public wells; (4) the Hazardous Materials Transportation Act (HMTA), which provides the Department of Transportation the authority to regulate the movement of hazardous materials; and (5) the Chemical Diversion and Trafficking Act (CDTA), which is designed to prevent the diversion of chemicals to illegal drug producers.

In addition to these Federal statutes, there are also international agreements and state laws that significantly affect the chemical industry. These include, for example, the Protocol to Limit Emissions of Chlorofluorocarbons, signed in 1987 in Montreal, Canada, to limit chlorofluorocarbon production. State governments are also increasingly active in the environmental and safety areas. In addition to the state implementation role in many federal programs, the states themselves are active in a range of issues that impact the chemical industry. These include hazardous waste, toxics use reduction, chemical specific taxes and fees, and state right-to-know statutes.

During the past two decades, the U.S. chemical industry has conducted an extensive program to reduce the emissions of the many types of materials that contribute to air, water, and land pollution. The industry's environmental actions have necessitated capital expenditures for pollution abatement and control that have totalled nearly $12 billion since 1973. In 1989, capital expenditures for pollution abatement and control were an estimated $1.5 billion, about 14 percent of chemical industry fixed capital investment. Surveys indicate that this is expected to increase to 17 percent in 1990. With passage of an amendment to the Clean Air Act, as much as 30 to 40 percent of the industry's fixed capital investment may be allocated to pollution abatement and control. The chemical industry's capital expenditures for pollution abatement and control are about 35 percent of those by all manufacturing industries.

The period since the early-1970s has also witnessed increasing gross annual operating costs (depreciation, labor, material and supplies, services, etc.) for pollution abatement and control. Estimated at $3.5 billion in 1989, these operating costs represent about 1.3 percent of the industry's value of shipments. In 1989, the chemical industry accounted for 21 percent of all manufacturing gross annual costs for pollution abatement and control.

The U.S. chemical industry has also achieved a remarkable record of safety, much better than manufacturing as a whole and other sectors of the economy. This record has continually improved during the post-Worl War II period, largely as a result of elimination of job hazards and the industry's initiatives in implementing effective safety programs.

Pollution abatement costs of U.S. Industry - both capital expenditures and operating costs for pollution control - are rising rapidly.

Chart 7.1

Chemical Industry Pollution Abatement

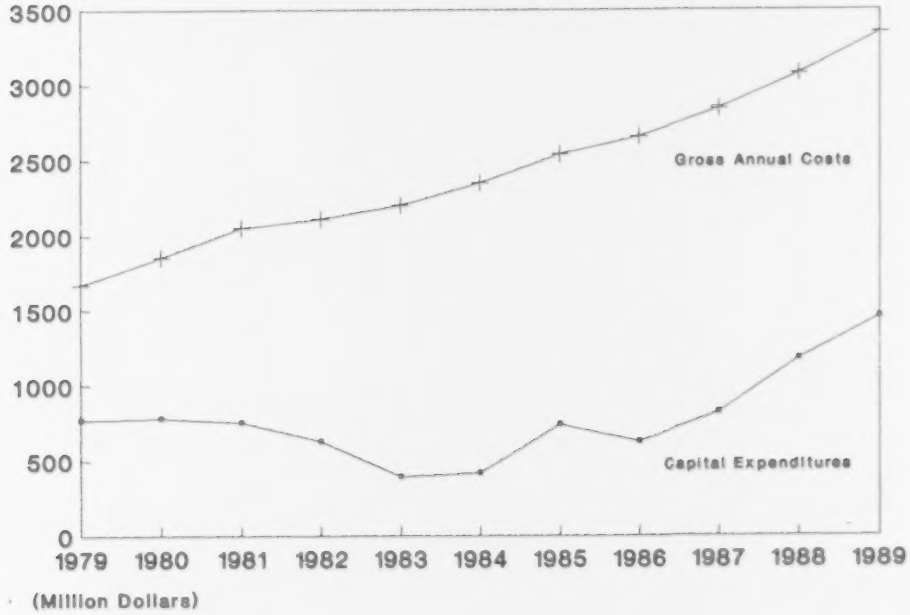


TABLE 7.1
POLLUTION ABATEMENT CAPITAL EXPENDITURES (MILLION DOLLARS) *

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	n/a	3638	3565	3503	3485	3024	2045	2172	2810	2847	3084	3501	4050	1.3%	13.3%	15.7%
Air	n/a	2236	2072	2105	2194	1828	1029	1038	1292	1463	1499	1523	1660	-2.2%	9.8%	9.0%
Water	n/a	1280	1246	1147	1028	977	819	887	1018	1039	1124	1345	1595	2.5%	12.5%	18.6%
Solid Waste	n/a	122	247	251	263	219	197	247	500	345	461	632	795	12.4%	26.3%	25.8%
Chemicals & Allied Products	n/a	780	771	781	753	628	395	418	738	624	817	1174	1450	6.5%	28.2%	23.5%
Air	n/a	360	315	326	335	273	159	143	194	198	259	371	450	3.6%	25.8%	21.3%
Water	n/a	386	361	350	322	257	187	212	272	325	395	544	650	6.1%	25.1%	19.5%
Solid Waste	n/a	35	96	105	96	98	49	63	273	101	163	259	350	13.8%	40.9%	35.1%

* Data series begin in 1973
Source: Bureau of the Census
1987 and 1988 data are CMA estimates based on Census and BEA data

TABLE 7.2
POLLUTION ABATEMENT GROSS ANNUAL COSTS (MILLION DOLLARS) *

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	n/a	3674	7400	8142	9110	8565	9925	10888	11678	12258	13118	14561	16150	8.1%	8.2%	10.9%
Air	n/a	1508	3062	3298	3698	3456	3807	4189	4330	4262	4273	4481	4720	4.4%	2.4%	5.3%
Water	n/a	1407	3016	3193	3554	3489	3943	4296	4610	4820	4982	5362	5790	6.7%	6.2%	8.0%
Solid Waste	n/a	670	1323	1651	1856	1620	2175	2403	2738	3177	3863	4718	5640	15.6%	18.6%	19.5%
Chemicals & Allied Products	n/a	807	1668	1852	2048	2107	2198	2345	2540	2654	2844	3075	3350	7.2%	7.4%	8.9%
Air	n/a	250	485	540	572	556	625	622	673	647	678	706	750	4.5%	3.8%	6.2%
Water	n/a	431	895	943	1069	1112	1106	1206	1268	1302	1366	1429	1500	5.3%	4.5%	5.0%
Solid Waste	n/a	127	287	369	407	438	467	517	599	706	800	940	1100	14.4%	16.3%	17.0%

* Data series begin in 1973
Source: Bureau of the Census
1987 and 1988 data are CMA estimates based on Census and BEA data

U.S. industrial output has grown 26% since 1979. But contrary to popular opinion, pollution levels in most sectors have been declining.

Chart 7.2
Trends in Industrial Emissions

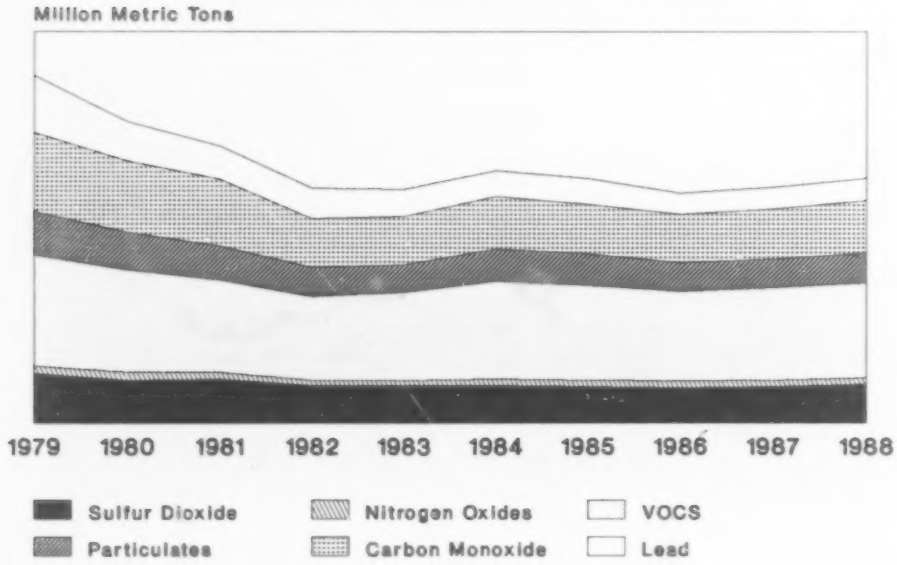


TABLE 7.3
SUMMARY OF PROGRESS IN KEY POLLUTION INDICATORS (MILLION METRIC TONS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Sulfur Dioxide													
Total Emissions	28.4	25.8	24.8	23.4	22.6	21.4	20.7	21.5	21.1	20.9	20.6	20.7	n/a
Industrial Processes	6.4	5.0	4.4	3.8	3.9	3.3	3.3	3.3	3.2	3.1	3.2	3.4	n/a
% of Total	22.5%	19.4%	17.7%	16.2%	17.3%	15.4%	15.9%	15.3%	15.2%	14.8%	15.5%	16.4%	
Chemicals & Allied Products	0.5	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	n/a
% of Total	1.9%	1.3%	1.0%	1.1%	1.0%	0.8%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	
Nitrogen Oxides													
Total Emissions	18.5	19.5	21.6	20.9	20.9	20.0	19.3	19.8	19.8	19.0	19.3	19.8	n/a
Industrial Processes	0.7	0.7	0.7	0.7	0.6	0.5	0.5	0.6	0.6	0.6	0.6	0.6	n/a
% of Total	3.8%	3.5%	3.4%	3.3%	3.1%	2.7%	2.8%	2.9%	2.8%	2.9%	3.0%	3.0%	
Chemicals & Allied Products	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	n/a
% of Total	1.3%	1.1%	1.0%	1.0%	0.9%	0.7%	0.7%	0.7%	0.7%	0.6%	0.7%	0.7%	
Volatile Organic Compounds													
Total Emissions	25.0	22.8	22.4	21.1	19.8	18.4	19.3	20.3	19.1	18.3	18.6	18.6	n/a
Industrial Processes	8.9	8.3	9.9	9.2	8.3	7.5	7.9	8.8	8.5	8.1	8.3	8.53	n/a
% of Total	35.7%	36.5%	44.1%	43.7%	42.1%	40.5%	40.8%	43.3%	44.6%	44.0%	44.6%	45.9%	
Chemicals & Allied Products	1.6	1.9	2.0	1.8	1.7	1.5	1.7	1.9	1.8	1.8	1.8	2.0	n/a
% of Total	6.2%	8.5%	8.9%	8.7%	8.8%	8.2%	9.0%	9.4%	9.5%	9.7%	9.6%	10.5%	
Particulates													
Total Emissions	18.5	10.6	8.9	8.5	8.0	7.1	7.1	7.4	7.1	6.8	7.0	6.9	n/a
Industrial Processes	10.5	5.2	3.8	3.3	3.0	2.6	2.4	2.8	2.8	2.5	2.5	2.6	n/a
% of Total	57.0%	49.1%	43.0%	38.8%	37.6%	36.0%	33.1%	37.6%	38.9%	37.4%	36.2%	37.3%	
Chemicals & Allied Products	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	n/a
% of Total	1.2%	1.1%	1.6%	1.6%	1.5%	1.4%	1.5%	1.8%	1.7%	1.3%	1.4%	1.4%	
Carbon Monoxide													
Total Emissions	101.4	84.1	81.7	79.6	77.4	72.4	74.5	71.8	67.0	63.1	64.1	61.2	n/a
Industrial Processes	9.0	7.2	7.1	6.3	5.9	4.3	4.3	4.7	4.4	4.3	4.5	4.7	n/a
% of Total													
Chemicals & Allied Products	3.1	2.0	2.3	2.0	2.6	2.1	2.2	2.5	2.5	2.5	2.6	2.6	n/a
% of Total													

Source: Environmental Protection Agency

Industry typically is the source of only a relatively small portion of total sulfur oxide and nitrogen oxide emissions.

Chart 7.3
SO2 and NOx Emissions By Source, 1988
(% of Total)

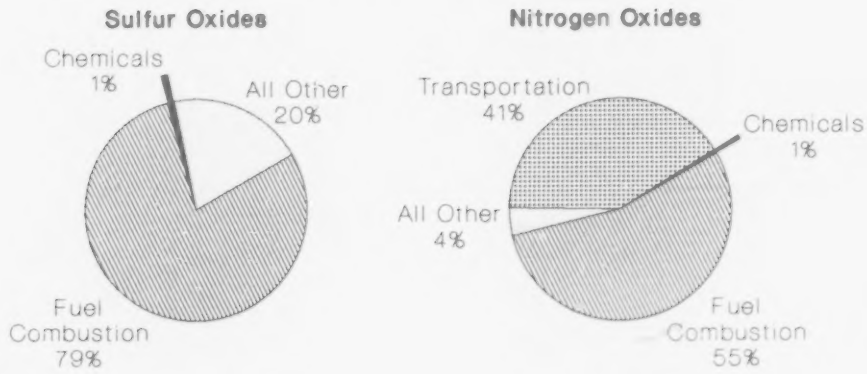


TABLE 7.4
U.S. EMISSIONS OF SULFUR OXIDES BY SOURCE (MILLION METRIC TONS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Sulfur Oxide Emissions	28.4	25.8	24.8	23.4	22.6	21.4	20.7	21.5	21.1	20.9	20.6	20.7	n/a
Transportation	0.6	0.7	0.9	0.9	0.9	0.8	0.8	0.8	0.9	0.9	0.9	0.9	n/a
Fuel Combustion	21.3	20.2	19.5	18.7	17.8	17.3	16.7	17.4	17.0	16.9	16.6	16.4	n/a
Industrial Processes	6.4	5.0	4.4	3.8	3.9	3.3	3.3	3.3	3.2	3.1	3.2	3.4	n/a
Chemicals & Allied Products	0.5	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	n/a
Other Industrial	5.9	4.7	4.1	3.5	3.7	3.1	3.1	3.1	3.0	2.9	3.0	3.2	n/a
Chemicals as a % of Total Emissions	1.9%	1.3%	1.0%	1.1%	1.0%	0.8%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	

Source: Environmental Protection Agency

TABLE 7.5
U.S. EMISSIONS OF NITROGEN OXIDES BY SOURCE (MILLION METRIC TONS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Nitrogen Oxide Emissions	18.5	19.5	21.6	20.9	20.9	20.0	19.3	19.8	19.8	19.0	19.3	19.8	n/a
Transportation	8.0	9.3	10.1	9.8	10.0	9.4	8.9	8.8	8.9	8.3	8.0	8.1	n/a
Fuel Combustion	9.1	9.3	10.5	10.1	10.0	9.8	9.6	10.2	10.2	10.0	10.5	10.8	n/a
Industrial Processes	0.7	0.7	0.7	0.7	0.6	0.5	0.5	0.6	0.6	0.6	0.6	0.6	n/a
Chemicals & Allied Products	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	n/a
Other Industrial	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.5	n/a
Solid Waste	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	n/a
Miscellaneous	0.3	0.1	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.2	n/a
Chemicals as a % of Total Emissions	1.3%	1.1%	1.0%	1.0%	0.9%	0.7%	0.7%	0.7%	0.7%	0.6%	0.7%	0.7%	

Source: Environmental Protection Agency

Industrial processes were only one of several sources of VOC and particulate emissions in 1988.

Chart 7.4
VOCs & Particle Emissions By Source,1988
(% of Total)

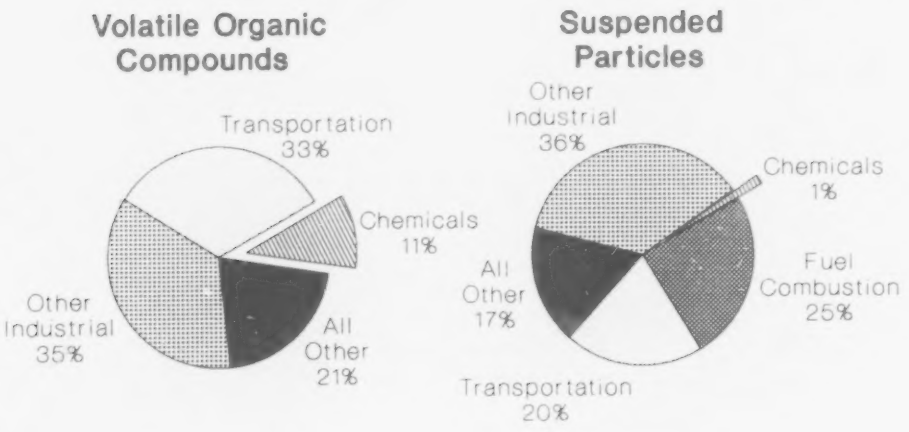


TABLE 7.6
U.S. EMISSIONS OF VOLATILE ORGANIC COMPOUNDS BY SOURCE (MILLION METRIC TONS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
VOC Emissions	25.0	22.8	22.4	21.1	19.8	18.4	19.3	20.3	19.1	18.3	18.6	18.6	n/a
Transportation	10.3	8.8	8.0	7.5	7.4	7.2	7.1	7.2	6.9	6.5	6.4	6.1	n/a
Fuel Combustion	0.6	0.6	0.9	0.9	0.9	1.0	1.0	1.0	0.9	0.9	0.9	0.9	n/a
Industrial Processes	8.9	8.3	9.9	9.2	8.3	7.5	7.9	8.8	8.5	8.1	8.3	8.53	n/a
Chemicals & Allied Products	1.6	1.9	2.0	1.8	1.7	1.5	1.7	1.9	1.8	1.8	1.8	2.0	n/a
Other Industrial	7.4	6.4	7.9	7.4	6.6	6.0	6.1	6.9	6.7	6.3	6.5	6.6	n/a
Solid Waste	1.8	0.9	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	n/a
Miscellaneous	3.3	2.5	2.9	2.9	2.5	2.2	2.7	2.7	2.2	2.2	2.4	2.4	n/a
Chemicals as a % of Total Emissions	6.2%	8.5%	8.9%	8.7%	8.8%	8.2%	9.0%	9.4%	9.5%	9.7%	9.6%	10.5%	

Source: Environmental Protection Agency

TABLE 7.7
U.S. EMISSIONS OF PARTICULATES BY SOURCE (MILLION METRIC TONS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Particulate Emissions	18.5	10.6	8.9	8.5	8.0	7.1	7.1	7.4	7.1	6.8	7.0	6.9	n/a
Transportation	1.2	1.3	1.4	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.4	n/a
Fuel Combustion	4.6	2.8	2.5	2.4	2.3	2.2	2.0	2.1	1.8	1.8	1.8	1.7	n/a
Industrial Processes	10.5	5.2	3.8	3.3	3.0	2.6	2.4	2.8	2.8	2.5	2.5	2.6	n/a
Chemicals & Allied Products	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	n/a
Other Industrial	10.3	5.1	3.7	3.2	2.9	2.5	2.2	2.7	2.6	2.5	2.4	2.5	n/a
Solid Waste	1.1	0.6	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	n/a
Miscellaneous	1.1	0.7	0.9	1.1	0.9	0.7	1.1	0.9	0.8	0.8	1.0	0.9	n/a
Chemicals as a % of Total Emissions	1.2%	1.1%	1.6%	1.6%	1.5%	1.4%	1.5%	1.8%	1.7%	1.3%	1.4%	1.4%	

Source: Environmental Protection Agency

Industry typically is the source of only a small portion of carbon monoxide.

Chart 7.5
CO and Lead Emissions By Source, 1988
(% of Total)

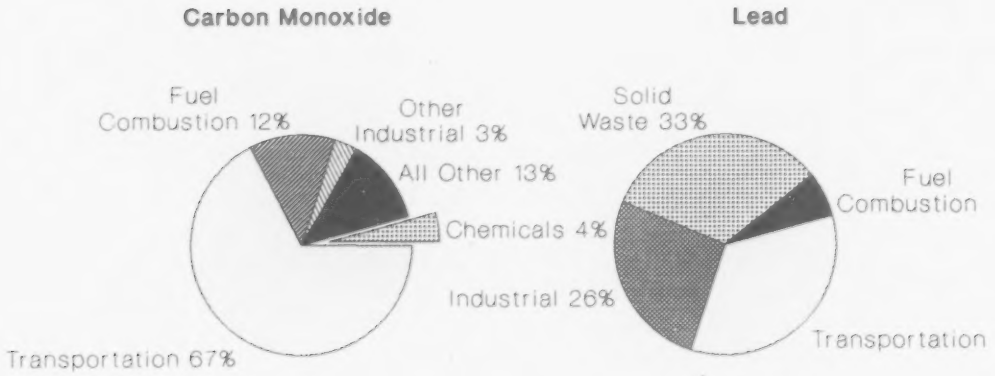


TABLE 7.8
U.S. EMISSIONS OF CARBON MONOXIDE BY SOURCE (MILLION METRIC TONS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Carbon Monoxide Emissions	101.4	84.1	81.7	79.6	77.4	72.4	74.5	71.8	67.0	63.1	64.1	61.2	n/a
Transportation	74.4	65.0	59.1	56.1	55.4	52.9	52.4	50.6	47.9	44.6	43.2	41.2	n/a
Fuel Combustion	4.5	4.3	6.7	7.4	7.7	8.2	8.2	8.3	7.4	7.5	7.6	7.6	n/a
Industrial Processes	9.0	7.2	7.1	6.3	5.9	4.3	4.3	4.7	4.4	4.3	4.5	4.7	n/a
Chemicals & Allied Products	3.1	2.0	2.3	2.0	2.6	2.1	2.2	2.5	2.5	2.5	2.6	2.6	n/a
Other Industrial	5.9	5.2	4.8	4.4	3.2	2.3	2.1	2.2	1.9	1.8	1.9	2.1	n/a
Solid Waste	6.4	3.1	2.3	2.2	2.1	2.0	1.9	1.9	2.0	1.7	1.7	1.7	n/a
Miscellaneous	7.2	4.8	6.5	7.6	6.4	4.9	7.7	6.3	5.3	5.0	7.1	6.0	n/a
Chemicals as a % of Total Emissions	3.0%	2.4%	2.8%	2.4%	3.4%	2.9%	3.0%	3.5%	3.7%	3.9%	4.0%	4.2%	

Source: Environmental Protection Agency

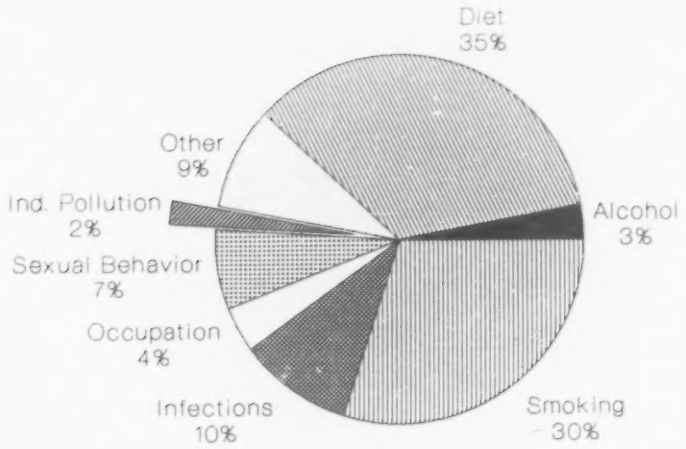
TABLE 7.9
U.S. EMISSIONS OF LEAD BY SOURCE (THOUSAND METRIC TONS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Lead Emissions	203.8	147.0	108.7	70.6	56.4	54.4	46.4	40.1	21.1	8.6	8.0	7.6	n/a
Transportation	163.6	122.6	94.6	59.4	46.9	46.9	40.8	34.7	15.5	3.5	3.0	2.6	n/a
Fuel Combustion	9.6	9.3	4.9	3.9	2.8	1.7	0.6	0.5	0.5	0.5	0.5	0.5	n/a
Industrial Processes	23.9	10.3	5.2	3.6	3.0	2.7	2.4	2.3	2.3	1.9	1.9	2.0	n/a
Solid Waste	6.7	4.8	4.0	3.7	3.7	3.1	2.6	2.6	2.8	2.7	2.6	2.5	n/a

Source: Environmental Protection Agency

Air and Water pollution typically are the cause of only a relatively small portion of total incidence of cancer.

Chart 7.6
Causes of Cancer in the United States



Source: *The Causes of Cancer: Quantitative Estimates of Avoidable Risks Of Cancer in the United States* by Richard Doll & Richard Peto (1981)

TABLE 7.10
RADIATION LEVELS IN PASTEURIZED MILK (ANNUAL MEAN EXPOSURE IN PICOCURIES PER LITER)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Strontium-90	7.3	3.9	3.5	2.8	2.8	2.8	2.3	2.1	2.0	1.9	1.9	1.6	1.5	-8.1%	-6.5%	-6.3%
Cesium-137	8.0	9.0	4.0	6.8	2.5	4.1	1.6	2.1	2.7	5.5	6.6	4.0	2.8	-3.5%	5.9%	-30.0%

Source: Environmental Protection Agency

TABLE 7.11
CONTAMINANTS LEVELS IN HERRING GULL EGGS - CHANTRY ISLAND, LAKE HURON (PARTS PER MILLION)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
DDE	n/a	11.85	2.54	2.83	4.08	5.03	2.22	2.55	2.47	2.00	1.00	1.10	0.77	-11.3%	-21.3%	-30.0%
Dieldrin	n/a	0.31	0.28	0.23	0.25	0.29	0.20	0.19	0.29	0.24	0.10	0.21	0.15	-6.1%	-4.6%	-28.6%
Mirex	n/a	0.48	0.20	0.16	0.35	0.58	0.16	0.49	0.14	0.13	0.11	0.07	0.05	-12.9%	-36.6%	-28.6%
HCB	n/a	0.18	0.10	0.08	0.07	0.08	0.05	0.07	0.05	0.05	0.02	0.04	0.03	-11.3%	-15.6%	-25.0%
PCB	n/a	39.33	31.08	23.41	27.70	38.06	16.86	21.54	14.25	12.30	7.70	8.00	6.20	-14.9%	-22.0%	-22.5%

Source: Environment Canada

The Chemical industry's incidence of injury and illness is one of American industry's lowest.

Chart 7.7

Incidence of Injury and Illness

TABLE 7.12

OCCUPATIONAL INJURY & ILLNESS INCIDENCE RATES (PER 100 FULL-TIME EMPLOYEES) *

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Manufacturing:													
Total Cases	n/a	13.0	13.3	12.2	11.5	10.2	10.0	10.6	10.4	10.6	11.9	13.1	n/a
Lost Workday Cases	n/a	4.5	5.9	5.4	5.1	4.4	4.3	4.7	4.6	4.7	5.3	5.7	n/a
Nonfatal Cases, No Lost Workdays	n/a	8.5	7.4	6.8	6.4	5.8	5.7	5.9	5.8	5.9	6.7	7.3	n/a
Lost Workdays	n/a	75.8	90.2	86.7	82.0	75.0	73.5	77.9	80.2	80.6	95.5	107.4	n/a
Chemicals & Allied Products:													
Total Cases	n/a	8.4	7.7	6.8	6.6	5.7	5.5	5.3	5.1	6.3	7.0	7.0	n/a
Lost Workday Cases	n/a	2.9	3.5	3.1	3.0	2.5	2.5	2.4	2.3	2.7	3.1	3.3	n/a
Nonfatal Cases, No Lost Workdays	n/a	5.5	4.2	3.7	3.6	3.2	3.0	2.8	2.8	3.5	3.9	3.8	n/a
Lost Workdays	n/a	48.9	54.9	50.3	48.1	39.4	42.3	40.8	38.8	49.4	58.8	59.0	n/a

* Data series begin in 1972 and 1973

Source: Bureau of Labor Statistics

Data after 1985 are not comparable to 1974-1985 data because of changes in reporting.

Section 8
Energy

The U.S. chemical industry is energy intensive and relies on energy inputs not only as fuel and power for its operations, but also as raw materials, or feedstocks, in the production of many of its products. Chemical industry energy consumption for these purposes amounted to 5.3 quads (quadrillion BTUs) in 1989, about 7 percent of total U.S. energy consumption. The industry's energy needs are equivalent to about 2.5 million barrels of crude oil per day, but are drawn from a wide mix of energy sources:

Crude Oil and Derivatives	45%
Natural Gas	30%
Electricity	17%
Coal	6%
Others	2%

Fuel and power accounted for 57 percent (3.1 quads) of total chemical industry energy consumption, with feedstocks accounting for the remaining 2.3 quads (43 percent) of energy consumed. The chemical industry is the single largest user of natural gas, accounting for 10 percent of all U.S. natural gas consumption. The chemical industry is also a large user of petroleum products, accounting for about 6 percent (1.1 million barrels of oil per day) of all U.S. petroleum products consumption.

Energy represents a significant share of U.S. chemical industry manufacturing costs. For some products, energy for both fuel and power needs and feedstocks account for up to 85 percent of total production costs. In 1989, the industry spent an estimated $18 billion on purchases of fuel and power and feedstocks.

Overall, however, this energy cost represents only 7 percent of the value of industry shipments. Moreover, value-added by the industry is equivalent to five times this energy cost, which is just one of many inputs, including raw materials and services, that it purchases from other industries.

The U.S. chemical industry has achieved significant energy productivity gains. Energy consumption per unit of output declined by 41 percent between 1972 and 1985, a trend that should continue in the 1990s. Further improvements in energy productivity are essential, however, for the U.S. chemical industry to maintain its competitive edge in domestic and world markets.

During the past decade, the U.S. chemical industry has made significant progress in improving energy efficiency.

Chart 8.1

Energy Productivity Trends

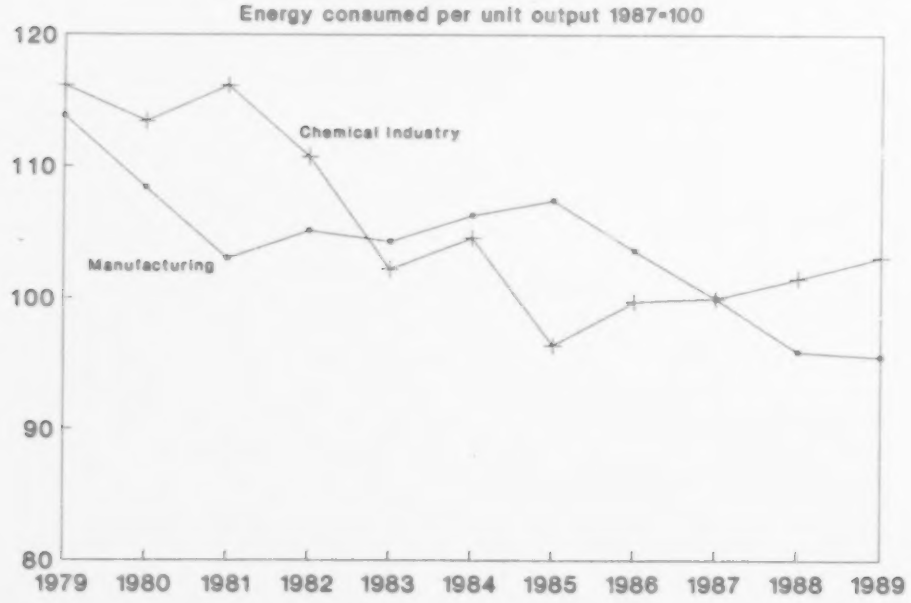


TABLE 8.1
FUEL AND POWER CONSUMPTION (QUADRILLION BTUS)

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	12710	12084	12869	11946	11563	11251	11794	13266	13748	13653	13980	14190	14540	1.2%	1.9%	2.5%
Chemicals & Allied Products	2528	2806	2895	2721	2830	2474	2442	2613	2407	2577	2732	2923	3055	0.5%	3.2%	4.5%

Source: Bureau of the Census, CMA estimates

TABLE 8.2
ELECTRIC POWER USE (1987=100)*

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Manufacturing	n/a	84.0	101.7	96.9	97.3	87.1	90.8	97.8	95.5	96.1	100.0	104.7	108.0	0.6%	2.0%	3.2%
Chemicals & Allied Products	n/a	98.2	110.6	100.9	100.3	92.4	97.5	102.0	99.0	98.0	100.0	99.9	109.9	-0.1%	1.5%	10.0%
Industrial Inorganic Chemicals	n/a	118.8	124.7	109.0	106.9	98.8	101.6	106.5	100.9	98.4	100.0	95.8	112.6	-1.0%	1.1%	17.5%
Plastics Materials and Synthetics	n/a	61.4	84.3	79.8	80.6	73.0	85.7	91.2	90.9	95.5	100.0	106.1	106.3	2.3%	3.1%	0.2%
Drugs	n/a	55.0	70.0	73.7	76.9	79.1	83.8	86.6	90.0	97.0	100.0	107.2	106.0	4.2%	4.1%	-1.1%
Soaps, Cleaners, and Toilet Goods	n/a	70.2	80.3	79.5	80.0	79.9	86.1	88.4	92.0	98.5	100.0	107.6	111.7	3.4%	4.8%	3.8%
Industrial Organic Chemicals	n/a	123.0	138.1	138.1	138.9	122.4	126.1	113.6	106.5	99.6	100.0	94.4	98.8	-3.3%	-2.8%	4.7%
Agricultural Chemicals	n/a	92.0	126.3	134.0	137.1	117.1	107.9	115.5	111.3	102.1	100.0	104.7	104.4	-1.9%	-2.0%	-0.3%

* Data series begin in 1972
Source: Federal Reserve Board

TABLE 8.3
ENERGY INPUT PRICES

Item/Year	1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth Rates 1989/79	1989/84	1989/88
Crude Oil, Wellhead ($/bbl)	3.18	7.67	12.64	21.59	31.77	28.52	26.19	25.88	24.09	12.51	15.40	12.58	15.85	2.3%	-9.3%	26.0%
Natural Gas, Wellhead ($/000 cubic feet)	0.17	0.44	1.18	1.59	1.98	2.46	2.59	2.66	2.51	1.94	1.67	1.69	1.71	3.8%	-8.5%	1.2%
Coal, Mine Value ($/ton)	6.26	19.23	23.65	24.52	26.29	27.14	25.85	25.51	25.10	23.70	23.00	22.09	21.77	-0.8%	-3.1%	-1.4%
Industrial Electricity Rates (cents/kWh)	n/a	2.07	3.05	3.69	4.29	4.95	4.96	5.04	5.16	4.90	4.72	4.62	4.72	4.5%	-1.3%	2.2%

Source: Department of Energy

Section 9
State Chemical Industries

The regions and states of the United States are economically interdependent. Each state's economy depends on the continuing availability of goods and services from other states and on its ability to sell its goods and services throughout the nation.

The U.S. chemical industry takes certain petroleum products, natural gas, and other naturally-occurring raw materials and converts them into a wide variety of basic chemicals. These basic chemicals (including petrochemicals such as ethylene, propylene, and butadiene) are then transferred to other sectors of the chemical industry for conversion into chemical intermediates (phthalic anhydride, vinyl chloride, etc.) and final chemical products such as plastics, man-made fibers, synthetic rubber, etc. In turn, these chemical industry products are fabricated by many different industries into thousands of essential industrial and consumer products.

The United States was an early leader in developing a chemical industry. The industry has gone through several growth phases, the first of which centered around the turn of the century. The most recent period of rapid growth began during World War II. Much of this growth in the basic chemicals (and petrochemicals) segment of the industry has been concentrated along the U.S. Gulf Coast, where necessary petroleum and natural gas raw materials (or feedstocks) are available. Much of basic chemicals production is still concentrated in the Gulf Coast area with Texas and Louisiana producing about 70 percent of all primary petrochemicals. The conversion of these basic chemicals into plastics, man-made fibers, synthetic rubber, and other chemical products are not as heavily concentrated on the Gulf Coast. Instead, the foci of production tends to be more diffuse. For example, the majority of total man-made fiber production occurs in the Southeast, while production of other chemical products such as plastics, pharmaceuticals, and fertilizers is even more widely dispersed among the states.

The ten leading states in chemical shipments are New Jersey, Texas, Illinois, Louisiana, Ohio, California, New York, Pennsylvania, North Carolina, and Tennessee. Combined, the chemical industry in these 10 states employed nearly 550,000 people and accounted for 61 percent of total industry shipments in 1986.

Although the chemical industry makes a vital contribution to the economy of every state, 61 percent of chemical production is concentrated in 10 states.

Chart 9.1

Chemical Shipments by State - 1986

($197 Billion)

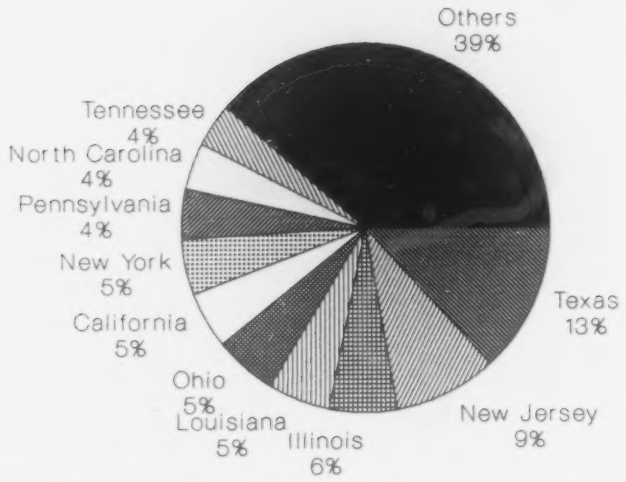


TABLE 9.1
TOP 30 CHEMICAL PRODUCING STATES, 1986

	State	Total Gross State Product (million $)	Chemical Gross State Product (million $)	Chemical Employment (thousands)	Downstream Chemical Employment (thousands)	Wages and Salaries (million $)	Value of Chemical Shipments (million $)	Chemical Exports (million $
1	Texas	303510	6383	75.0	1251.3	2707	25982	6742
2	New Jersey	154765	6898	117.4	696.7	3961	17965	2115
3	Illinois	209666	4318	56.3	1063.9	1860	11720	1560
4	Louisiana	74426	1992	26.0	214.5	1002	10799	2632
5	Ohio	176102	3874	62.8	1027.9	2002	10763	1536
6	California	533816	3734	64.7	1893.3	1870	9930	1346
7	New York	362736	4278	62.3	1257.5	2053	9560	1409
8	Pennsylvania	183559	3739	58.2	1037.5	1942	8663	985
9	North Carolina	100961	1980	38.4	767.3	1033	7973	1254
10	Tennessee	72328	1746	37.9	510.3	1139	7385	1535
11	Indiana	84922	2120	29.5	574.1	1016	6896	1206
12	South Carolina	44727	1846	32.2	359.9	958	6292	1389
13	Michigan	153240	2159	39.9	1027.4	1424	6098	1109
14	Virginia	104155	1702	32.8	436.5	945	5435	1171
15	Missouri	83534	1897	28.1	323.8	941	4817	523
16	Florida	177729	1152	24.1	656.7	667	4675	1234
17	Georgia	102922	1374	19.3	421.3	508	4508	547
18	West Virginia	24096	1135	19.0	111.9	673	3983	1149
19	Kentucky	53135	793	12.9	261.0	400	3898	708
20	Alabama	55007	616	11.2	322.8	342	3308	554
21	Maryland	76504	919	12.7	177.5	375	2669	380
22	Massachusetts	115526	874	17.2	545.4	537	2630	385
23	Connecticut	70639	1387	22.5	340.6	871	2615	353
24	Wisconsin	76922	661	10.1	495.2	315	2109	172
25	Iowa	43836	794	6.2	164.9	170	2065	287
26	Delaware	11706	1573	30.8	60.4	1254	2005	255
27	Kansas	42472	598	8.2	135.0	231	1909	146
28	Washington	77683	624	11.5	263.7	382	1518	268
29	Mississippi	31830	447	6.4	235.9	164	1458	400
30	Minnesota	75626	439	n/a	266.7	237	1246	86
	United States	4240300	70100	990.7	20187.3	33093	197090	34365

Source: Bureau of the Census

Definition of the Chemical Industry

There is no single definition of the chemical industry for statistical purposes. Data in this handbook are cited in the basis on which they were published. To the greatest extent possible, data herein cover Chemicals and Allied Products (SIC 28) on an industry basis. According to the *Standard Industrial Classification Manual*, SIC 28 includes both establishments producing basic chemicals and establishments manufacturing products by predominantly chemical processes. Establishments classified in this major group manufacture three general classes of products: (1) basic chemicals, such as acids, alkalies, salts, and organic chemicals; (2) chemical products to be used in further manufacture, such as synthetic fibers, plastic materials, dry colors, and pigments; and (3) finished chemical products to be used for ultimate consumption, such as drugs, cosmetics, and soaps; or to be used as materials or supplies in other industries, such as paints fertilizers, and explosives. The first class - basic chemicals - accounted for about 26 percent ($65.3 billion) of the chemical industry's $255.6 billion shipments in 1989 while the second class accounted for 22 percent ($56.3 billion). The third class - finished chemical products - accounted for about 52 percent ($134 billion) of the industry's shipments in 1989.

Data on R&D funding, new plant & equipment expenditures, and finances of the industry, however, are reported on a company basis which differs in concept from data reported on an industry basis.

CMA
CHEMICAL
MANUFACTURERS
ASSOCIATION

2501 M Street, NW
Washington, DC 20037

202 887-1100
Telex 89617 (CMA WSH)

printed on recycled paper

A3850-1-W

U.S. CHEMICAL INDUSTRY STATISTICAL HANDBOOK

1991

CMA
CHEMICAL MANUFACTURERS ASSOCIATION

U.S. Chemical Industry Statistical Handbook

1991

CHEMICAL MANUFACTURERS ASSOCIATION
2501 M Street, NW
Washington, D.C. 20037
202-887-1100
Telex 89617 (CMA WSH)

© 1991 Chemical Manufacturers Association, Inc.

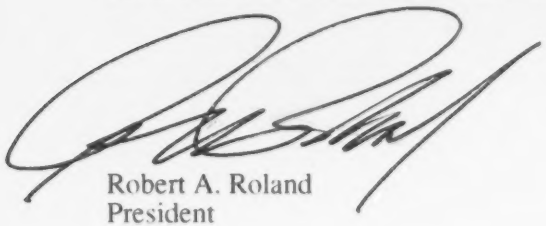
Introduction

September, 1991

This is the second edition of the Chemical Manufacturers Association's "U.S. Chemical Industry Statistical Handbook". The objective of this publication, which is updated annually, is to provide an economic profile of the U.S. chemical industry and a comprehensive source of economic and other data about the industry.

We want this Handbook to meet industry and public needs. Suggestions for improvement will be welcomed.

The Chemical Manufacturers Association (CMA) is a nonprofit trade association whose approximately 185 member companies account for more than 90 percent of the basic industrial chemical productive capacity in the United States. Founded in 1872, CMA is the oldest manufacturing trade association in the Western Hemisphere.



Robert A. Roland
President

Technical Notes and Acknowledgements

Unless otherwise noted, all statistical data are drawn from official U.S. government sources.

Data sources are noted at the bottom of each table. Lack of space precludes inclusion in this publication of all notes concerning methods and sources which were included in the original statistical sources. For required detail users may find it necessary to consult the original source.

Many time series data go through several revisions. Thus, data for recent years may be preliminary and subject to later revisions.

The abbreviation n/a indicates that data was not available at the time of preparation of the series concerned.

The sum of individual data points within a table may not add to the indicated total due to independent rounding.

CEFIC is the acronym for the "Conseil Europe'en des Federations de Industrie Chimique", the European chemical industry association, a data source utilized in this publication.

WMTDB is the acronym for the "World Manufactures Trade Data Base," a data base created at CMA to allow assessments of world manufacturers trade flows.

Every effort has been made in the preparation of this publication to provide the best available information. However, CMA cannot be responsible for the accuracy of individual statistics.

This publication was prepared by the Trade and Economics Division of the Federal Government Relations Department of CMA. The cooperation of many contacts in government and other organizations is gratefully acknowledged.

Allen J. Lenz — (202) 887-1132
Director, Trade and Economics

T. Kevin Swift — (202) 887-1286
Senior Economist

Keith A. Christman — (202) 887-1396
Economist

Lea S. Williams — (202) 887-1165
Staff Assistant

Michelle L. Ray — (202) 887-1133
Senior Staff Assistant

Table of Contents
U.S. Chemical Industry Statistical Handbook

		PAGE
	TECHNICAL NOTES AND ACKNOWLEDGEMENTS	
1	RESPONSIBLE CARE	1
2	WHAT IS THE CHEMICAL INDUSTRY?	5
3	STATISTICAL HIGHLIGHTS	27
4	PRODUCTION, PRICES, AND FINANCIAL	29
	Industrial Production	33
	Capacity Utilization	33
	GNP by Industry	33
	Industry Shipments	35
	Inventories	35
	Price Indexes	37
	Income Statement	37
	Balance Sheet	38
	Financial Ratios	39
	Inorganic Chemicals Production	39
	Organic Chemicals Production	40
	Plastics Resins Production	41
	Industrial Gases Production	41
	Inorganic Fertilizers Production	41
5	U.S. INTERNATIONAL TRADE	43
	Summary of Chemicals Trade	45
	Chemicals Trade by Product	52
	Chemicals Trade by Selected Country	79
6	RESEARCH AND DEVELOPMENT	87
	R&D Funding	89
	Scientists & Engineers	89
	Patents Granted	90
5	INVESTMENT	91
	New Plant and Equipment Expenditures	93
	Gross Investment	93
	Capital Stocks and Capital Productivity	95
	Foreign Direct Investment and U.S. Investment Abroad	97
6	EMPLOYMENT AND LABOR	99
	Employment	101
	Production Employment	101
	Earnings	103
	Average Weekly Hours	105
	Labor Productivity and Unit Costs	105
7	HEALTH, SAFETY, AND ENVIRONMENTAL	107
	Pollution Abatement Capital Expenditures	109
	Pollution Abatement Gross Annual Costs	111
	Indicators of Environmental Progress	113
	Incidence of Injury and Illness	125
8	ENERGY	127
	Energy Consumption	129
	Feedstock Consumption	129
	Electric Power Use	130
	Energy Input Prices	130

Table of Contents
U.S. Chemical Industry Statistical Handbook

		PAGE
9	STATE CHEMICAL INDUSTRIES	131
10	WORLD CHEMICAL INDUSTRIES	135
	Chemical Industries of Selected Countries	138
	World Chemical Imports and Exports	141
	DEFINITION OF THE CHEMICAL INDUSTRY	153

Responsible Care:® A Public Commitment

RESPONSIBLE CARE® CODES

THE CHEMICAL INDUSTRY'S COMMITMENT TO THE PUBLIC

In September, 1988, the Board of the Chemical Manufacturers Association (CMA) adopted Responsible Care® - a voluntary initiative to continuously improve performance in health, safety and environmental quality. Participation in Responsible Care® is an obligation of membership - all CMA member companies must sign its Guiding Principles, implement its codes, and subscribe to the philosophy of continuous improvement and public involvement.

CMA's members account for 90% of the productive capacity for industrial chemicals in the United States. Since chemicals manufactured by CMA members touch almost every American's lifestyle, the ultimate impact of Responsible Care® is practically universal.

The broad scope of Responsible Care® covers the entire life cycle of the chemical process. Through a national citizen advisory panel, and an extensive national dialogue program, the public is directly involved in helping to shape the initiative. The initiative is now embedded in the management process of the association, directly affecting its decisions about policy, positions and programs.

Codes of Management Practices - Responsible Care® codes are performance objectives that encourage commitment, innovation and continual improvement. They are at the heart of the initiative, going far beyond the requirements of current law. Codes on Community Awareness and Emergency Response, Pollution Prevention, Process Safety and Distribution are being implemented. Codes on Employee Health and Safety and Product Stewardship will be completed by early 1992. The goal of Responsible Care® is long-term significant improvement in the industry's environmental, health and safety performance.

Public Involvement - A national citizen advisory panel acts as a sounding board for public concerns and is made up of a cross section of environmental, health and safety thought leaders. Panel members directly shape the initiative by reviewing proposed Codes of Management Practices, and suggesting ways for industry to respond to public concerns. Member companies are also strongly encouraged to form community advisory panels. Through the use of 50 separate public outreach activities, including an "800" number promoted through national advertising, public questions and reactions are encouraged and solicited.

Performance Measures - Effective performance evaluation is a critical element of Responsible Care®. Each code includes an evaluation form that requires every company, on a yearly basis, to assess and report to CMA where they stand with implementing each element for each code. The evaluations track the collective progress of CMA members and serve as the basis for targeting additional Association support. Many companies are using total quality programs and measures to implement Responsible Care®.

The Responsible Care® initiative is having a significant impact on the culture and performance of the industry. Two examples:

- Members have reduced industry wide emissions to air, land and water by 15% in the past two years. This has come at a time of 8.5% increased production and a growing contribution ($16.5 billion in 1990) to the U.S. trade balance.

- 95% of CMA members invited to participate in EPA's 1991 voluntary pollution control program agreed. 35% of all other industry members invited agreed.

The 180 members of CMA are demonstrating accelerating progress in lowering emissions, reducing transportation accidents and incidents, improving emergency response, and, most important, opening and maintaining a dialogue with people in the communities where they run their operations.

What Is The Chemical Industry?

The chemical industry takes natural raw materials from earth, water, and air and converts them into valuable products tailor-made for consumers and the nation's industries. The chemical industry's products have many applications:

- ❏ raw and basic materials for other industries;
- ❏ intermediate materials for other industries; and
- ❏ a wide variety of finished products for industry, agriculture, business and individual consumers.

Unlike most other industries, the chemical industry does not make one group or family of products derived from only a few key materials. It makes more than 60,000 chemical products from a vast array of metals, minerals, vegetable oils, animal fats, and other raw materials.

Products of the chemical industry are extensive; very few goods and services are produced in modern industrial societies without some input from the chemical industry. Chemicals are thus a "basic" industry that supplies every level of production and consumption. That is, it makes not only a wide variety of consumer goods, but products that are building blocks essential to our agricultural, construction, manufacturing, and service industries.

Synthetic fibers and permanent-press clothing, improved medicines, pharmaceuticals, health improvement products, better protective packaging materials, longer-lasting paints, stronger adhesives, more durable and safer synthetic tires, lighter-weight plastic automobile parts, and stronger composite materials in advanced aircraft and spacecraft are only a few of the thousands of the chemical industry's constant stream of new and innovative products.

Despite its keystone stature and the enormous range of its products, the size, nature and critical contributions of the chemical industry to the economy are not highly visible, probably because most chemical companies are not directly involved in the production of consumer products.

The charts which follow provide a simplified overview of some key parts of the chemical production chain, from raw material inputs to valued outputs. Figure A, "Chemical Industry Inputs and Primary Outputs," illustrates some basic organic and inorganic inputs and some resulting first-stage outputs.

Organic inputs, like oil and natural gas, contain hydrocarbons which form the backbone of final organic chemical outputs. In the first stage of processing raw materials are refined to produce primary outputs like benzene and methanol. Primary outputs like these are the building blocks of the chemical industry. In subsequent processing (Figures B-G) chemicals such as chlorine are added to the hydrocarbon backbones to give the compounds certain desired characteristics. The final output may, for example, be nylon or polyester fiber, plastic, a pharmaceutical product, or other products which are often not thought of as chemical industry outputs.

Inorganic inputs are often simple compounds such as salt. Salt can be broken down by electronics to produce chlorine and caustic soda (sodium hydroxide). Chlorine (Figure I), a common inorganic chemical, is used both by industries and consumers. The paper industry, for example, uses chlorine to bleach pulp and consumers may appreciate it as a means of keeping their clothes white and their drinking water safe. Caustic soda is another inorganic chemical used extensively in manufacturing processes and in the production of soaps and detergents.

The figures which follow do not attempt to report all chemical products and processes. The vast spectrum of chemical outputs makes it impractical to describe more than a few simple process chains.

CMA gratefully acknowledges the work of Ted Semegran, Executive Vice President and Lori Rieser of Shearson Lehman Brothers, in their "Chemical Industry Flow Chart", from which much of the data and format used in the chemical flow charts which follow was drawn. Their work reflects product mixes in markets at the end of the 1980's.

FIGURE A:

CHEMICAL INDUSTRY: INPUTS AND PRIMARY OUTPUTS

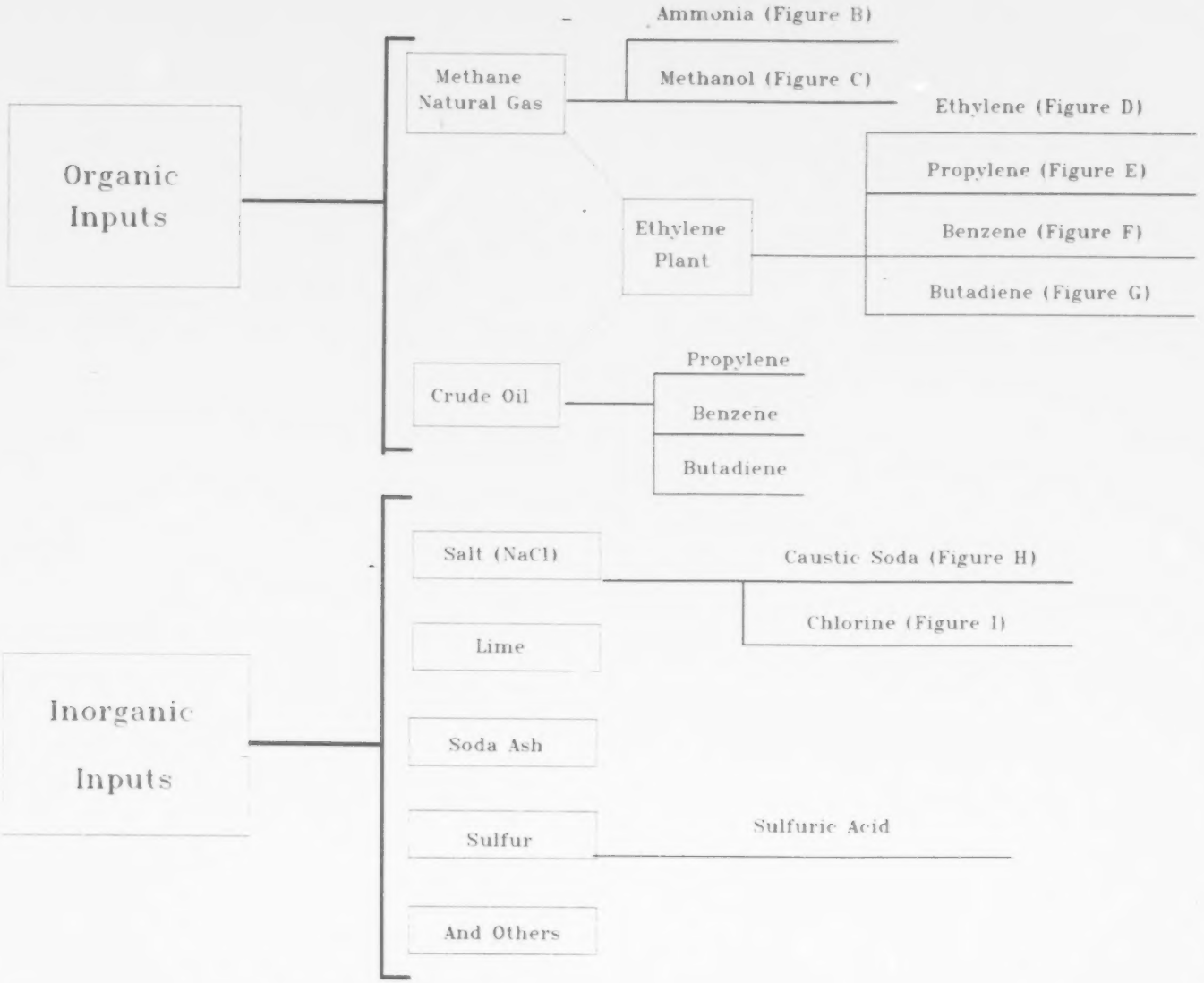


FIGURE B
THE AMMONIA CHAIN

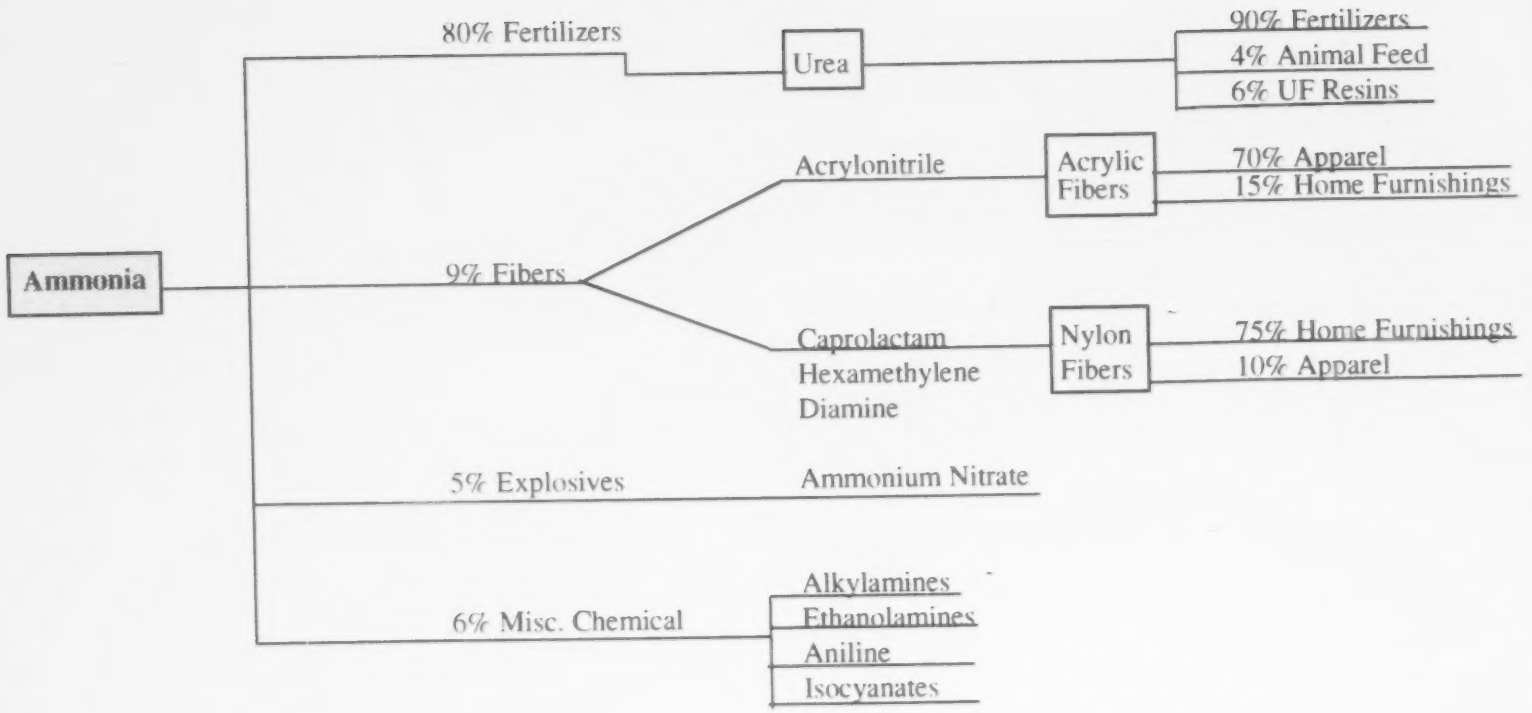


FIGURE C
THE METHANOL CHAIN

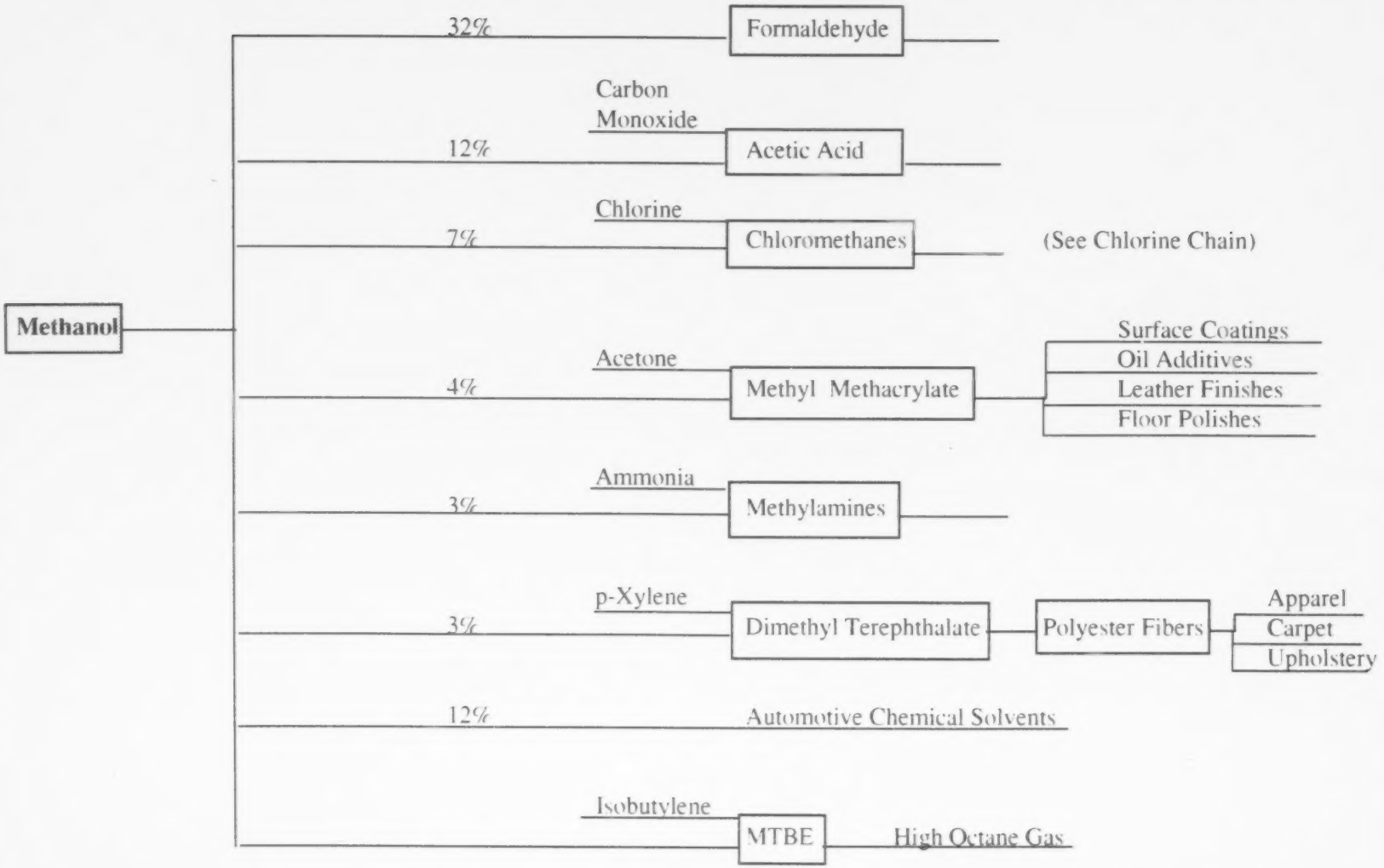


FIGURE D:
THE ETHYLENE CHAIN

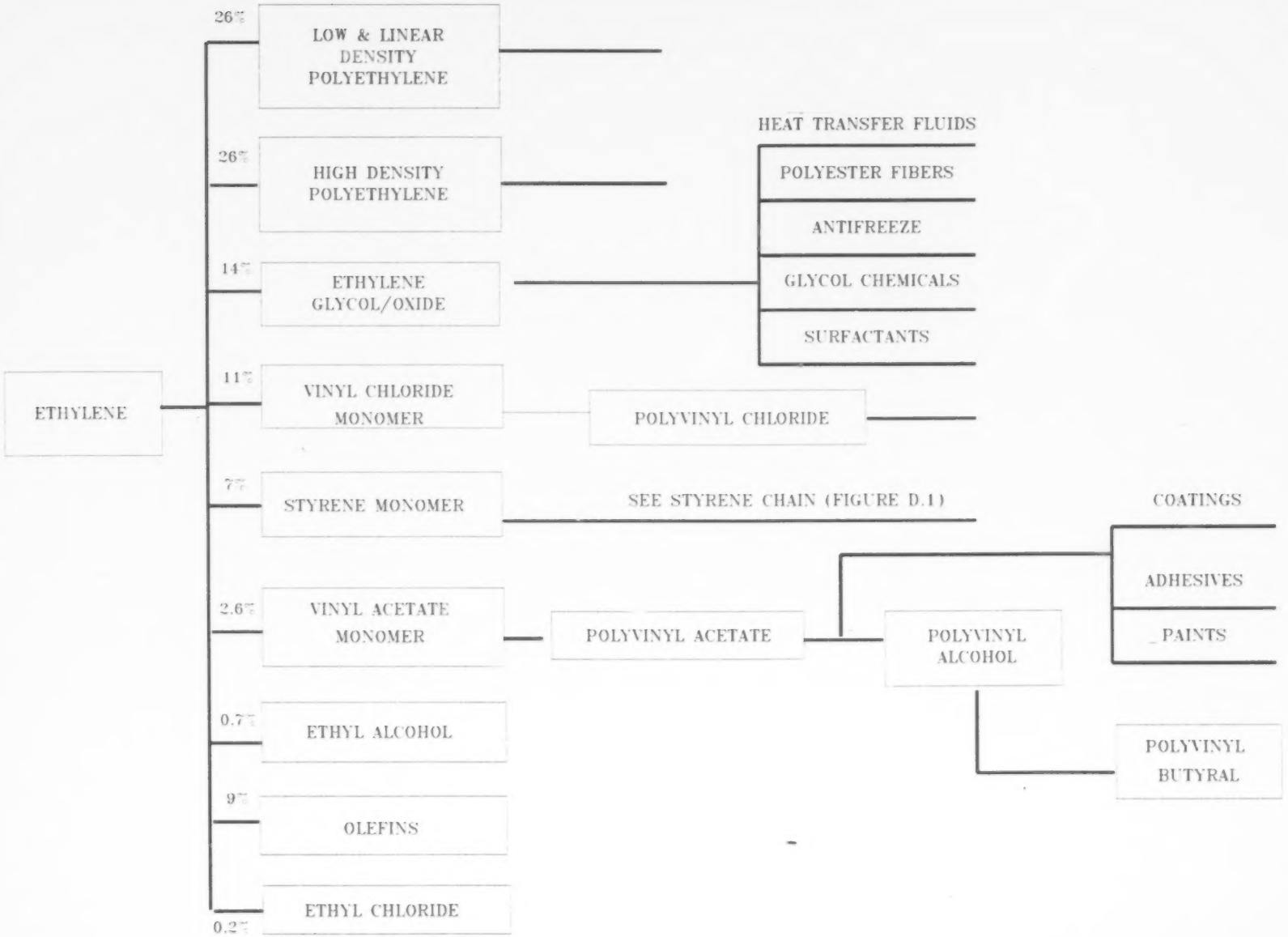


FIGURE D.1
THE STYRENE MONOMER CHAIN

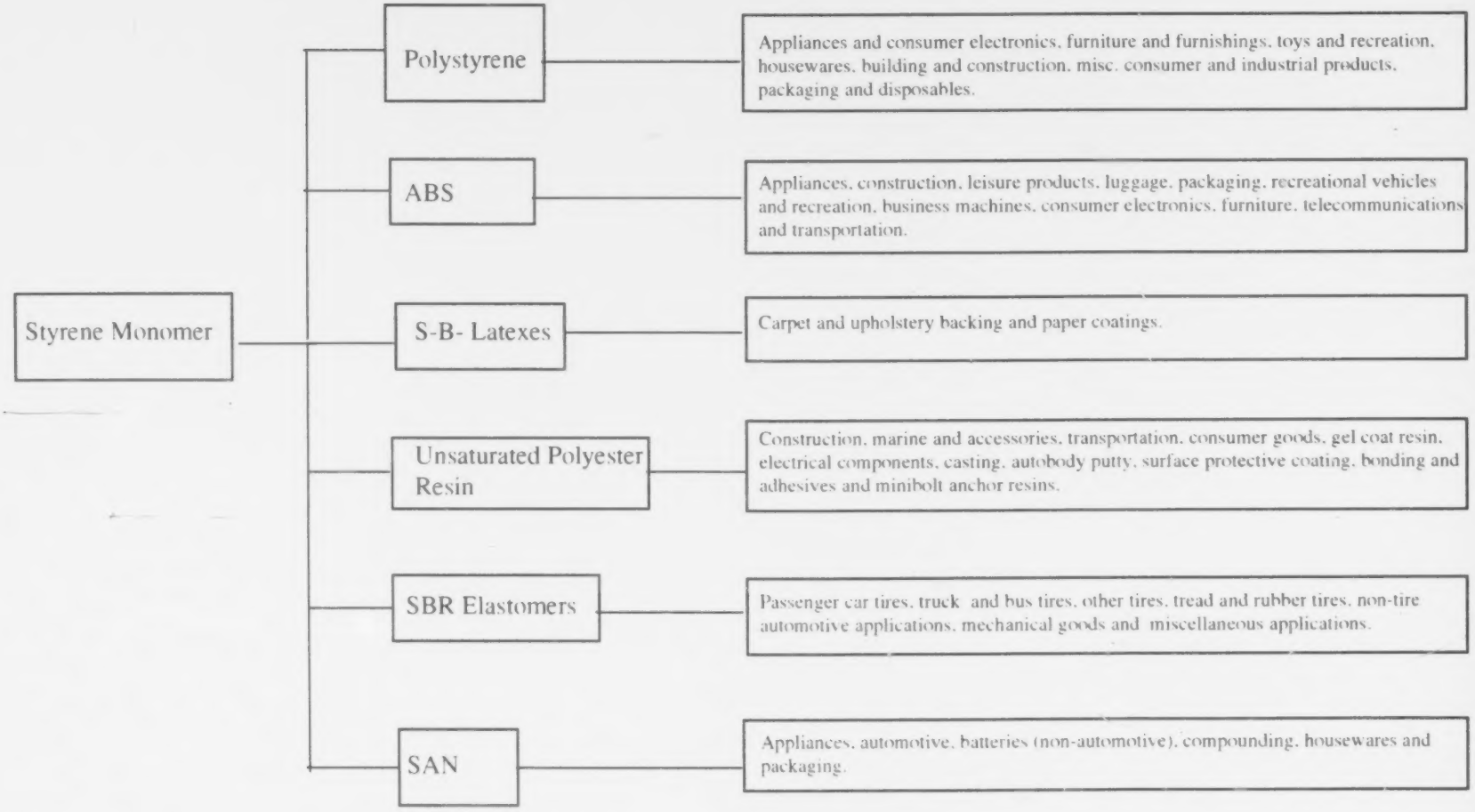

Styrene Monomer
Polystyrene
Appliances and consumer electronics, furniture and furnishings, toys and recreation, housewares, building and construction, misc. consumer and industrial products, packaging and disposables.
ABS
Appliances, construction, leisure products, luggage, packaging, recreational vehicles and recreation, business machines, consumer electronics, furniture, telecommunications and transportation.
S-B- Latexes
Carpet and upholstery backing and paper coatings.
Unsaturated Polyester Resin
Construction, marine and accessories, transportation, consumer goods, gel coat resin, electrical components, casting, autobody putty, surface protective coating, bonding and adhesives and minibolt anchor resins.
SBR Elastomers
Passenger car tires, truck and bus tires, other tires, tread and rubber tires, non-tire automotive applications, mechanical goods and miscellaneous applications.
SAN
Appliances, automotive, batteries (non-automotive), compounding, housewares and packaging.

FIGURE E:

THE PROPYLENE CHAIN

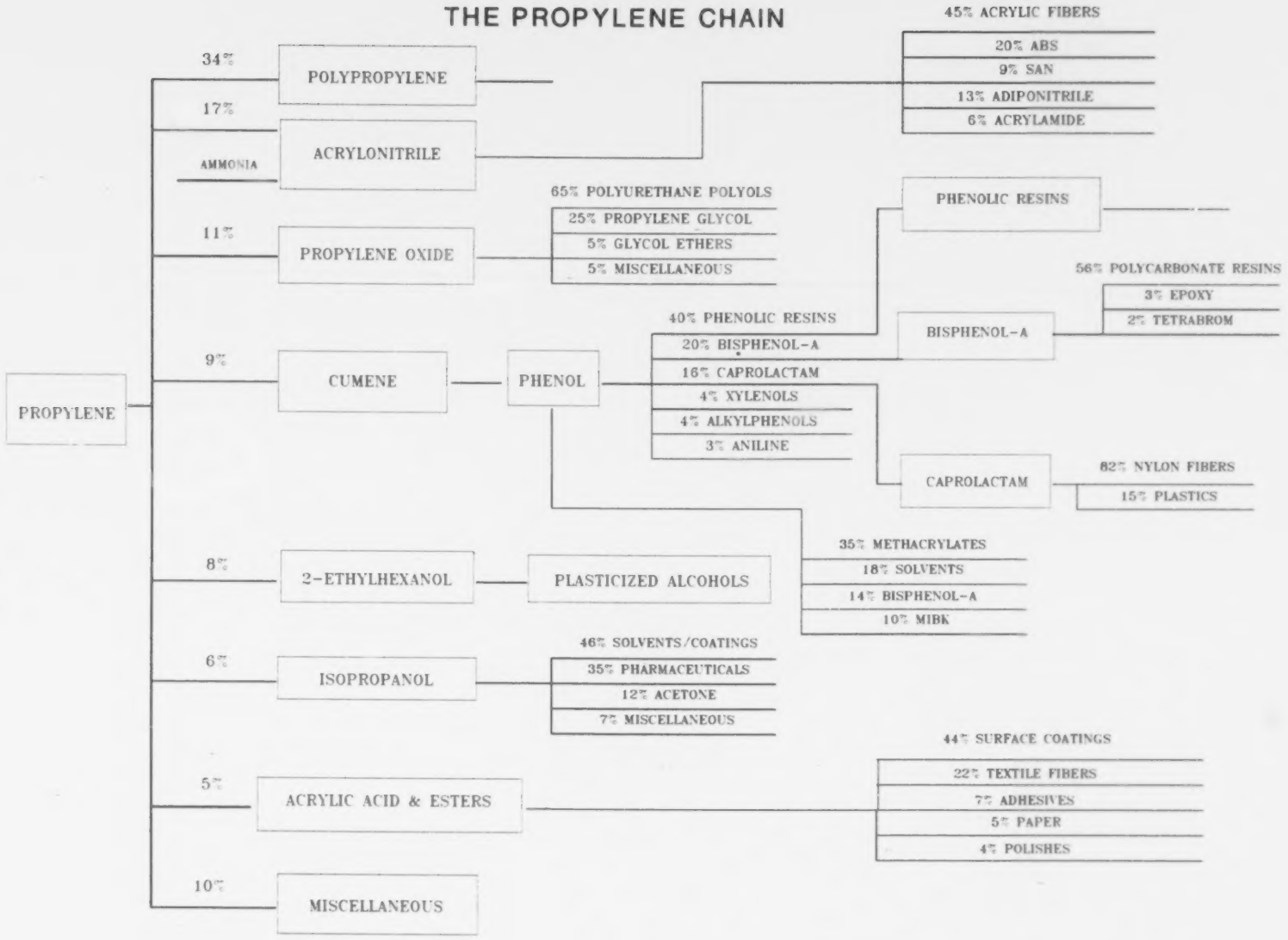


FIGURE F:

THE BENZENE CHAIN

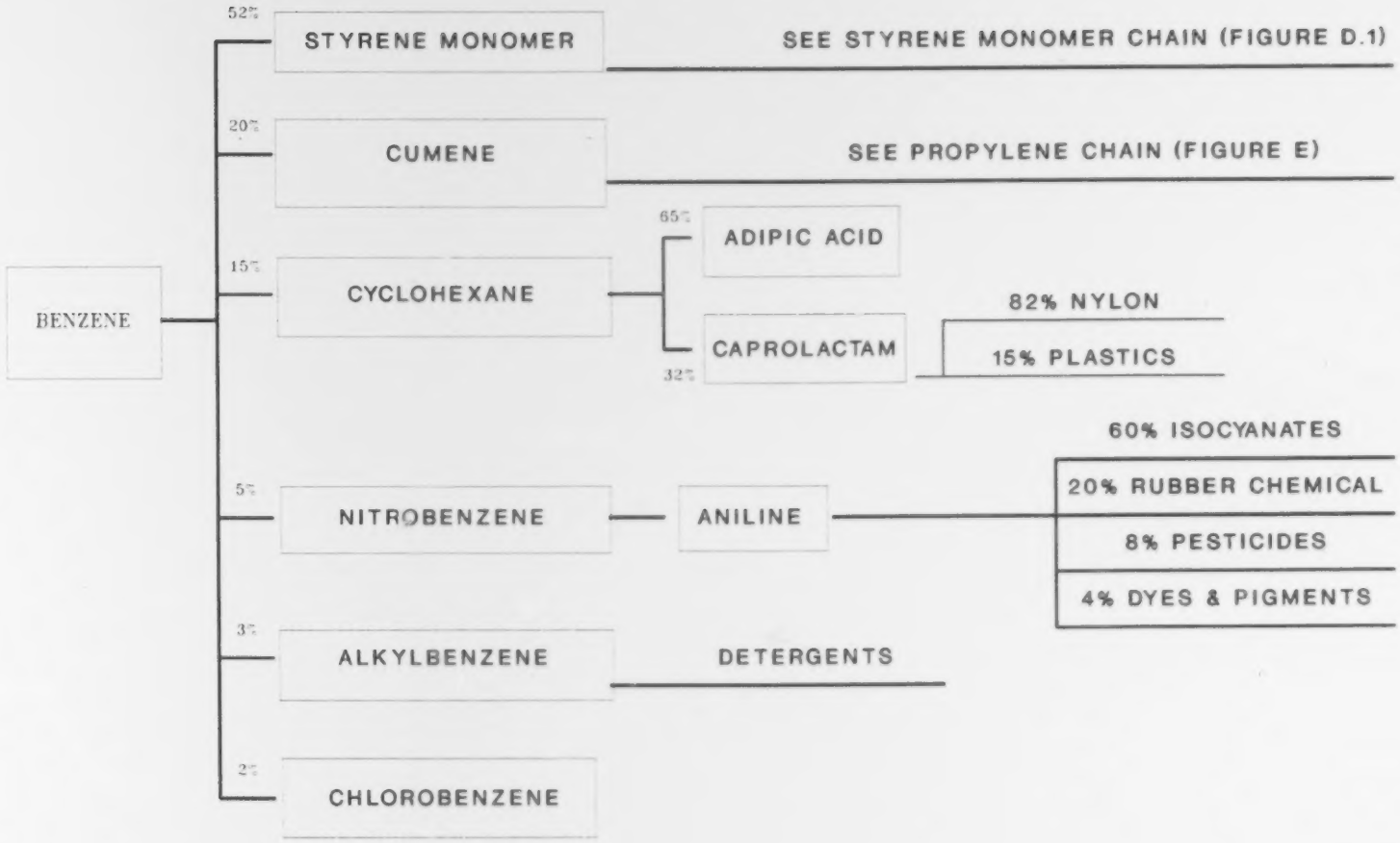


FIGURE G:

THE BUTADIENE CHAIN

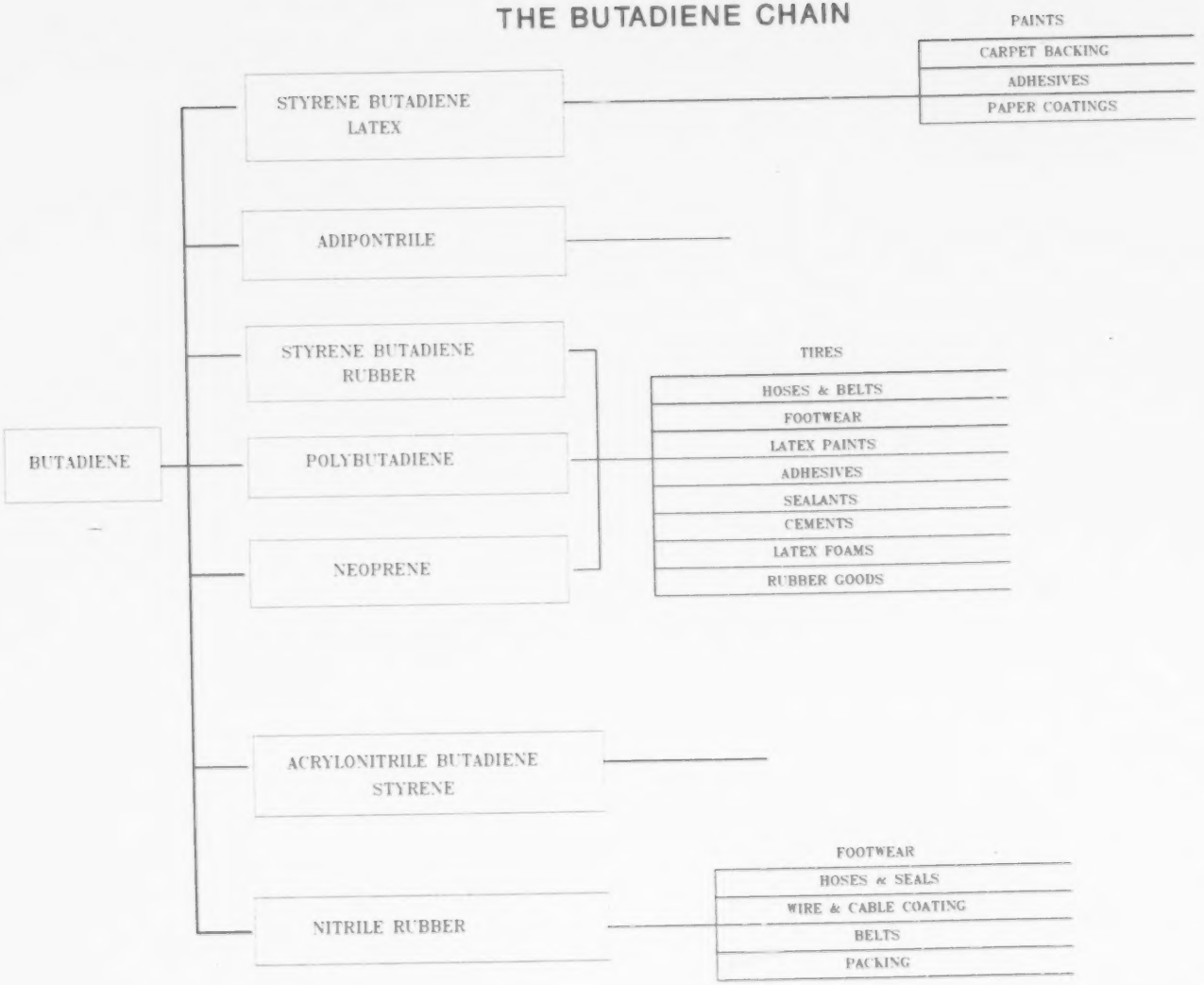


FIGURE H:
CAUSTIC SODA

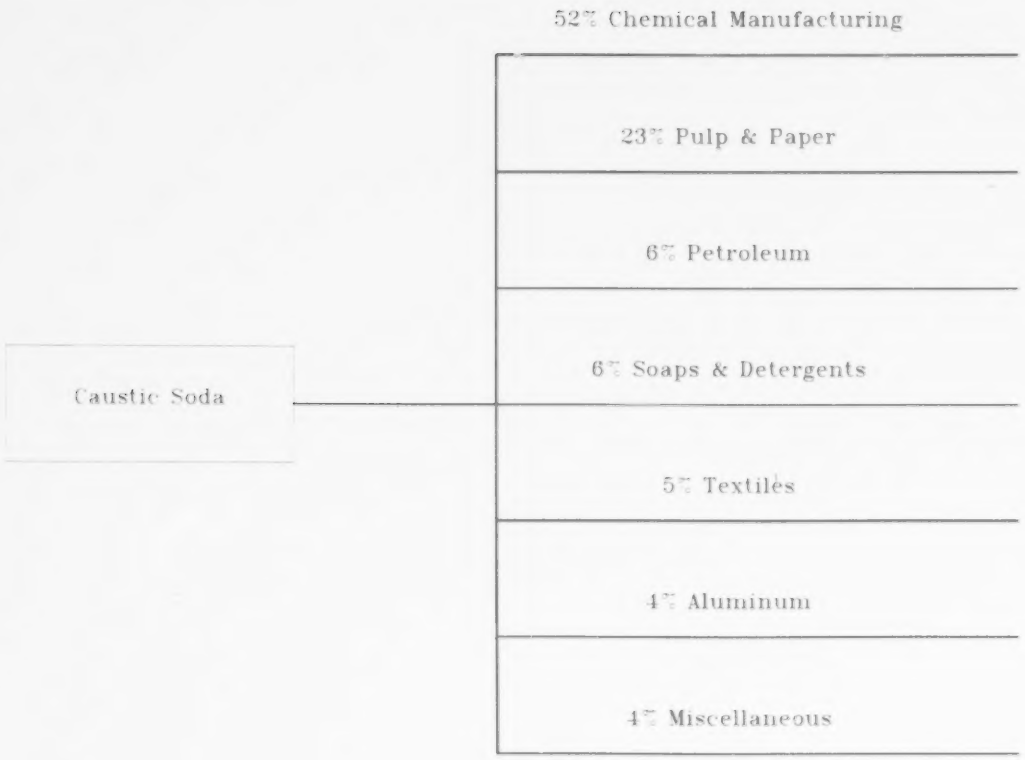
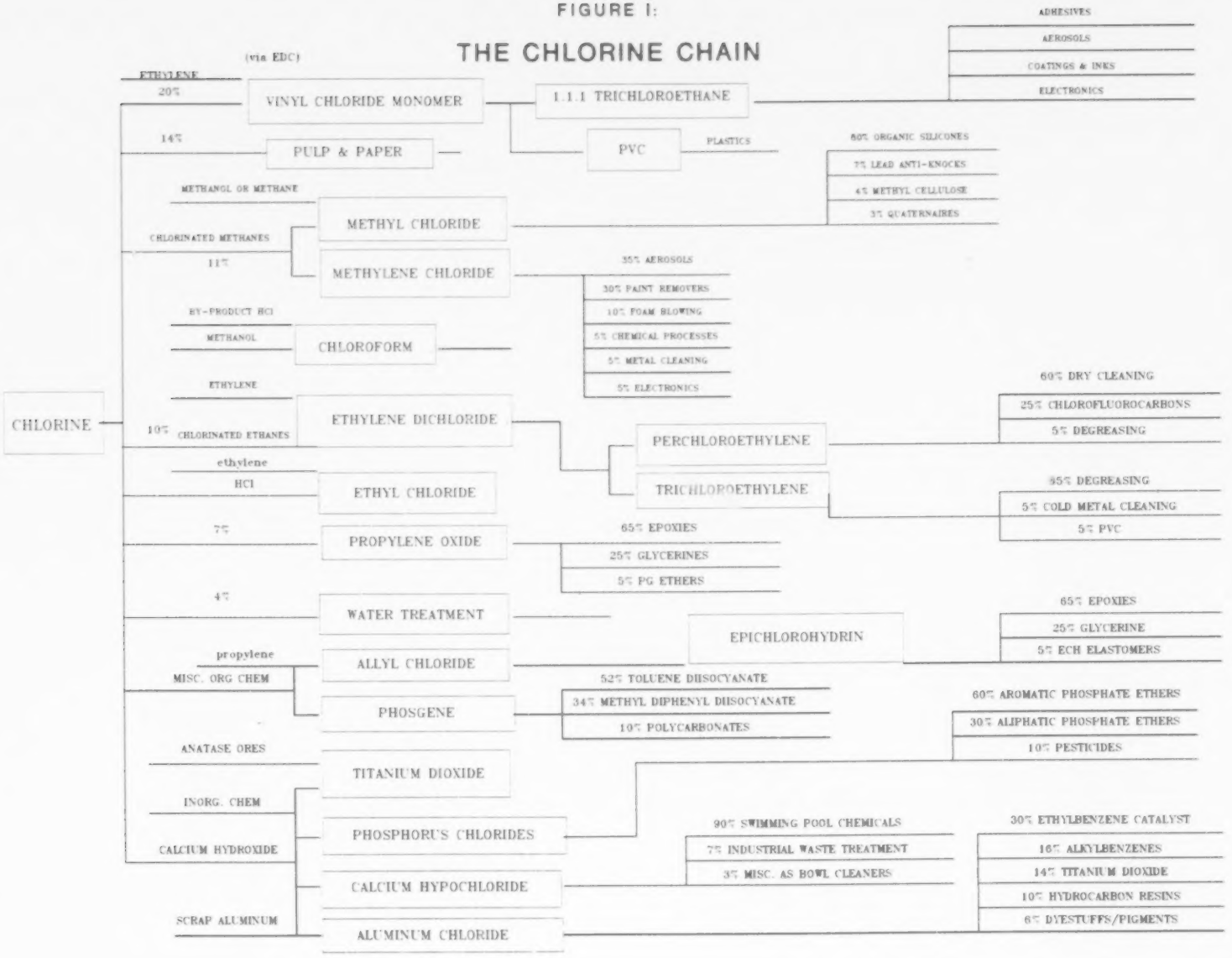


FIGURE I:

THE CHLORINE CHAIN



Section 1
Statistical Highlights

The U.S. chemical industry makes a wide variety of consumer goods as well as tens of thousands of products that are inputs to the production processes of the construction, manufacturing, service, and agriculture industries. Although one of the oldest U.S. industries, chemicals is a dynamic, high-technology, internationally competitive industry. It is the keystone of U.S. manufacturing, creating new products and processes essential to raising U.S. productivity and living standards.

The U.S. chemical industry produces over 60,000 different products and in 1990 employed 1.1 million people, about 5.7 percent of total manufacturing. Included are some 78,000 scientists, engineers, and technicians who are engaged in research and development (R&D).

About 55 percent of the industry's employees are production workers who earned average wages in 1990 that were 25 percent greater than those for manufacturing as a whole.

The chemical industry produces about 1.7 percent of total U.S. Gross National Product - roughly 8 percent of all U.S. manufacturing. It is the third largest manufacturing sector.

The chemical industry is strong and growing. In 1990, shipments reached $285.6 billion, a record, and a 3.8 percent increase over 1989 levels.

The industry's trade surplus in 1990 was $16.5 billion, a 0.7 percent decrease from 1989. Exports of $39.0 billion matched total U.S. agricultural exports, but were a 4.3 percent increase from the previous year and imports of $22.5 billion, a 8.5 percent increase. The U.S. chemical industry is the world's second largest (after West Germany) exporter accounting for over 13.5 percent of the estimated $280 billion in total world exports of chemicals.

Profits of $23.4 billion in 1990 provided the basis for new highs in R&D and capital expenditures for new plant and equipment needed to maintain the industry's international competitiveness.

Investment in new plant and equipment reached $20.5 billion in 1990, an 11.2 percent increase over 1989. Of this, $1.5 billion was spent for pollution abatement and control. In 1990, the industry spent $12.4 billion on R&D, up 8.3 percent from 1989.

The chemical industry's 1990 operating rate was 81.4 percent, down slightly from 83.9 percent in 1989.

TABLE 1.1
SUMMARY OF SELECTED INDICATORS - CHEMICALS & ALLIED PRODUCTS

Item/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Shipments (billion $)	168.2	186.9	176.3	189.6	206.0	204.8	205.7	229.5	259.7	275.2	285.6	5.4%	6.9%	3.8%
Production Index (1987=100)	87.8	89.2	81.8	87.5	91.4	91.4	94.6	100.0	105.4	108.5	110.1	2.3%	3.8%	1.5%
Corporation Sales (billion $)	163.2	188.8	186.4	201.3	209.6	202.8	205.8	225.2	261.6	278.3	286.9	5.8%	7.2%	3.1%
Net Income - After Taxes (billion $)	11.8	13.0	10.3	11.6	13.9	9.5	12.9	16.6	23.7	24.5	23.4	7.1%	19.6%	-4.7%
Net Income to Sales (%)	7.2%	6.9%	5.5%	5.8%	6.6%	4.7%	6.3%	7.4%	9.1%	8.8%	8.2%	- -	- -	- -
Total Assets (billion $)	148.9	171.5	182.0	187.6	193.1	205.3	217.2	244.4	277.6	293.3	324.5	8.1%	9.6%	10.6%
Net Income to Assets (%)	7.9%	7.6%	5.7%	6.2%	7.2%	4.6%	5.9%	6.8%	8.5%	8.4%	7.2%	- -	- -	- -
New Plant & Equipment Expenditures (billion $)	10.6	12.0	11.4	11.6	13.5	14.4	14.5	13.9	16.6	18.5	20.5	6.8%	7.4%	11.2%
Operating Rate (%)	78.7%	78.3%	71.0%	75.4%	78.0%	77.1%	78.9%	82.0%	83.9%	83.4%	81.4%	- -	- -	- -
Producer Price Index (1982=100)	89.0	98.4	100.0	100.3	102.9	103.7	102.6	106.4	116.3	123.0	123.6	3.3%	3.6%	0.5%
Total Employment (thousands)	1107.4	1109.0	1075.1	1042.8	1049.4	1044.1	1021.8	1025.9	1059.0	1073.8	1085.4	-2.0%	0.8%	1.1%
Average Weekly Wage - Production Workers ($)	344	379	408	440	464	485	502	523	536	555	575	5.3%	3.5%	3.6%
Funds for Research & Development (billion $)	4.3	5.2	6.2	6.8	7.7	8.3	8.7	9.4	10.6	11.4	12.4	11.3%	8.3%	8.3%
Exports (billion $)	20.7	21.2	19.9	20.0	22.8	21.8	22.5	26.0	31.9	37.4	39.0	6.5%	12.3%	4.3%
Imports (billion $)	8.6	9.5	9.5	11.0	13.9	14.7	15.3	15.6	20.3	20.7	22.5	10.1%	8.8%	8.5%
Trade Surplus (billion $)	12.1	11.7	10.4	9.0	8.9	7.1	7.2	9.5	11.6	16.6	16.5	3.1%	18.4%	-0.7%

Source: U.S. Department of Commerce, U.S. Department of Labor, Federal Reserve Board, and National Science Foundation.

Section 2
Production, Prices, and Financial

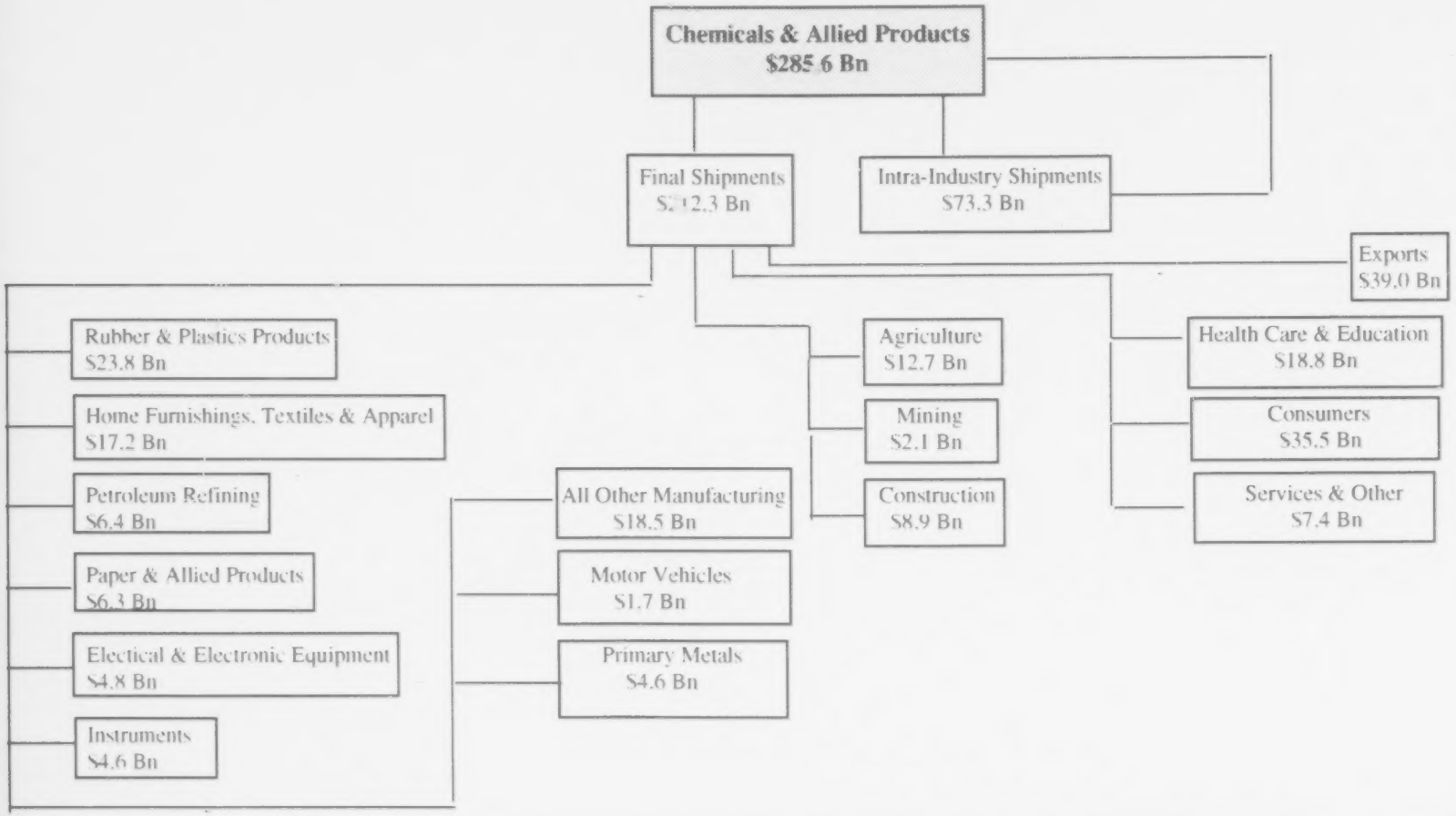
The $285.6 billion shipments of the U.S. chemical industry in 1990 include a wide variety of consumer goods as well as tens of thousands of products that are used extensively in the construction, manufacturing, service, and agricultural industries. Dating from 1635, chemicals is one of the oldest U.S. industries. However, it is also a dynamic, high-technology industry, investing billions of dollars annually in research and development (R&D). The U.S. chemical industry has remained internationally competitive, constantly creating new processes and producing more than 60,000 products that raise U.S. productivity and living standards.

Value-added by the U.S. chemical industry in 1990 was equivalent to roughly 1.7 percent of Gross National Product and about 8 percent of all U.S. manufacturing. The chemical industry is a key part of manufacturing and a key supplier to other manufacturing industries as shown in Chart 2.1. The chemical industry is the largest purchaser of chemicals, consuming 2.5 percent of the industry's output. The rest of manufacturing -- which includes a whole variety of industries engaged in mechanically or chemically transforming materials into new tangible goods -- purchases 31 percent of the U.S. chemical industry's output. The composition of the manufacturing sector, which accounts for 23 percent of the GNP, is shown in Chart 2.2. Large purchasers of chemicals in manufacturing include rubber & plastic products, textiles, apparel, petroleum, paper & allied products, and primary metals. Large non-manufacturing end-uses for chemicals include agriculture, construction, health care, and consumers.

In 1990, the U.S. chemical industry's production volume increased 1.5 percent, a pace somewhat higher than that for the overall U.S. economy. Despite slightly lower operating rates, profits (the third best year ever) in 1990 of $23.4 billion provided the basis for new highs in R&D spending and capital expenditures for new plant and equipment needed to maintain the industry's international competitiveness.

Composition of the industry has been changing, with increasing diversification into high-technology fields, such as pharmaceuticals, biotechnology, and advanced materials that have applications in transportation and other industries. The race to create new products and process technologies necessary to sustain a competitive edge in U.S. and world markets has increased the importance of R&D spending.

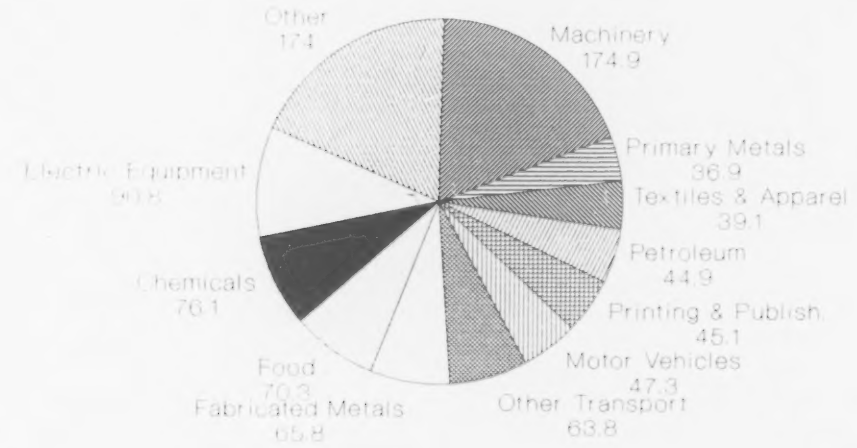
Chart 2.1
U.S. Chemical Industry Flow Chart, 1990



The above chart provides an estimate of the direct uses of the U.S. chemical industry's output. It is based on the 1986 Input-Output (I-O) Tables of the U.S. economy with some adjustments. The estimates reflect direct purchases by the consuming industry or sector. In effect, the chart shows which industries or sectors are customers of the chemical industry. Indirect use of chemicals incorporated into other industries output is not included. For example, the motor vehicle sector purchases tires from the rubber & plastics products industry, which purchases synthetic rubber to make tires. The value of this synthetic rubber would not be included in the $1.7 billion figure for motor vehicles. Total value of chemicals used could be several times larger.

The U.S. manufacturing sector - - which accounts for 23 percent of U.S. GNP - - includes several large industries such as non-electrical machinery, electric & electronic equipment, transportation equipment, and chemicals.

Chart 2.2
Value-Added By The Manufacturing Sector, 1989
($929 Billion 1982 Dollars)



Following the recession of the early-1980's, capacity utilization in the U.S. chemical industry steadily improved through 1988.

Chart 2.3
Capacity Utilization
(% of capacity)

Source: Federal Reserve Board

Capacity utilization rose from 71 percent in 1982 to 83.9 percent in 1988. Since 1988 U.S. capacity utilization has dropped slightly as a result of the recession and the rapid increase in U.S. and world capacity. U.S. capacity has increased 7.8 percent since 1988.

TABLE 2.1
INDUSTRIAL PRODUCTION INDICES (1987=100)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Manufacturing	56.4	61.1	78.8	80.3	76.6	80.9	89.3	91.6	94.3	100.0	105.8	108.9	109.9	3.4%	3.7%	0.9%
Chemicals & Allied Products	55.9	69.1	87.8	89.2	81.8	87.5	91.4	91.4	94.6	100.0	105.4	108.5	110.2	2.3%	3.8%	1.6%
Industrial Inorganic Chemicals	79.4	85.1	96.5	96.9	86.5	92.1	96.9	96.1	95.1	100.0	98.3	106.7	108.7	1.2%	2.5%	1.9%
Alkalies and Chlorine	n/a	100.8	101.5	94.6	82.1	87.9	95.3	93.6	92.1	100.0	96.0	103.2	99.5	-0.2%	1.2%	-3.6%
Industrial Gases	n/a	59.3	91.5	91.2	80.1	85.9	97.5	92.8	98.8	100.0	104.1	108.0	109.2	1.8%	3.3%	1.1%
Inorganic Pigments	n/a	97.1	90.6	90.7	79.1	87.3	89.0	95.1	96.2	100.0	102.6	111.0	104.3	1.4%	1.9%	-6.1%
Industrial Inorganic Chemicals, nec	96.3	85.9	96.8	98.7	89.2	94.3	98.0	97.2	94.7	100.0	96.4	105.9	110.4	1.3%	2.6%	4.2%
Plastics Materials and Synthetics	39.5	54.8	71.2	79.5	71.8	84.3	88.9	86.9	91.6	100.0	104.4	103.1	106.5	4.1%	4.2%	3.3%
Plastic Materials and Resins	30.4	41.0	64.2	68.3	64.4	74.4	81.1	84.1	88.2	100.0	106.8	106.7	115.8	6.1%	6.6%	8.5%
Synthetic Rubber	100.3	95.5	110.8	114.5	110.5	124.1	132.8	114.4	109.3	100.0	105.0	92.4	88.7	-2.2%	-5.0%	-4.0%
Man-Made Fibers	47.5	70.3	74.9	91.7	76.4	92.3	93.3	86.6	93.7	100.0	99.5	98.7	92.7	2.2%	1.4%	-6.1%
Drugs and Medicines	46.0	62.4	80.2	80.9	82.7	86.1	86.9	88.5	96.7	100.0	107.2	108.1	113.9	3.6%	5.2%	5.3%
Soap and Toiletries	68.1	79.3	103.5	97.7	89.2	91.4	90.6	91.3	96.7	100.0	107.8	111.1	112.3	0.8%	4.2%	1.1%
Paints and Allied Products	81.3	87.8	87.0	84.1	78.8	84.6	91.8	95.7	97.5	100.0	104.0	105.1	99.7	1.4%	0.8%	-5.1%
Industrial Organic Chemicals	n/a	69.9	92.8	97.0	81.0	89.9	93.4	94.1	95.1	100.0	103.1	109.2	107.2	1.5%	2.6%	-1.8%
Agricultural Chemicals	52.9	80.7	97.2	102.3	88.8	87.5	102.0	96.1	88.5	100.0	107.2	108.3	105.2	0.8%	1.8%	-2.9%

Source: Federal Reserve Board

TABLE 2.2
CAPACITY UTILIZATION (%)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Manufacturing	79.7	73.2	80.3	78.8	72.8	74.9	80.4	79.5	79.0	81.4	83.9	83.9	82.3
Chemicals & Allied Products	77.9	73.4	78.7	78.3	71.0	75.4	78.0	77.1	78.9	82.0	83.9	83.4	81.4
Plastic Materials	82.3	64.8	75.2	77.0	71.3	82.3	86.2	85.7	89.4	98.6	97.5	89.0	89.4
Synthetic Fibers	81.9	76.3	65.3	81.2	68.6	84.9	85.4	78.4	86.3	93.0	90.3	87.9	82.1

Source: Federal Reserve Board

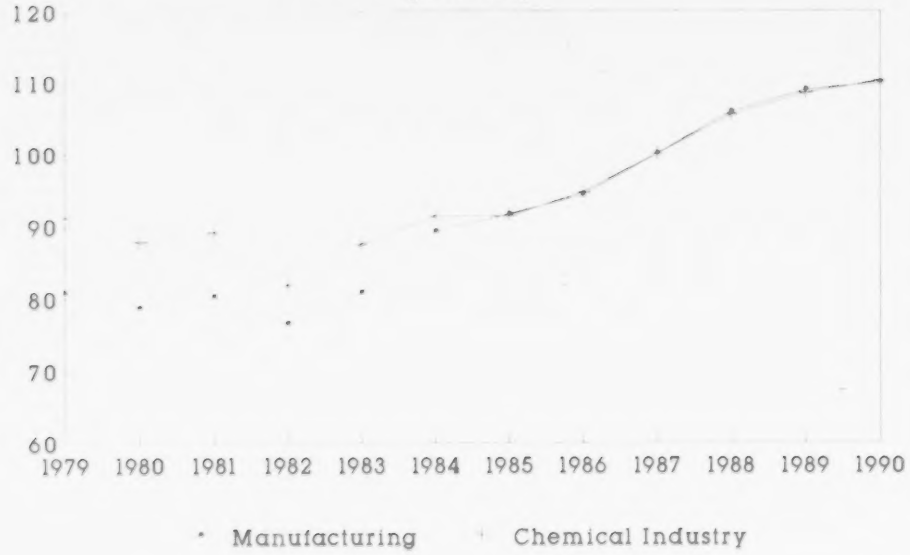
TABLE 2.3
GNP BY INDUSTRY (BILLION 1982 DOLLARS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Manufacturing	506.8	547.5	673.9	678.6	634.6	674.2	752.4	779.2	803.4	852.2	917.4	929.0	931.0	3.3%	3.6%	0.2%
Chemicals & Allied Products	34.4	39.3	50.0	54.0	55.3	59.7	59.4	59.1	64.6	71.9	77.5	76.1	77.4	4.5%	5.5%	1.7%

Source: Bureau of Economic Analysis
1990 data are CMA estimates based on BEA, Census, and FRB data

Following the recession of the early-1980's, chemical industry production expanded by 35 percent.

Chart 2.4
Industrial Production
(1987=100)



Source: Federal Reserve Board

The 35% increase from 1982 to 1990 is an average annual growth rate of 4.4%. In 1990 chemical industry output growth slowed to 1.6% as a result of the recession. By comparison manufacturing output grew by only 0.9% in 1990.

TABLE 2.4
INDUSTRY SHIPMENTS (MILLION DOLLARS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Manfacturing	633663	1039065	1852689	2017544	1960214	2070564	2288184	2334456	2335881	2475906	2682492	2840264	2917465	4.6%	4.6%	2.7%
Chemicals & Allied Products	49195	91710	168220	186909	176254	189552	203963	204790	205711	229546	259698	275187	285612	5.4%	6.9%	3.8%
By Segment:																
Industrial Chemicals, Except Pigments	26832	52046	101705	112764	100082	109141	119437	114654	112182	126177	145483	150647	156282	4.4%	6.4%	3.7%
Drugs, Soap, and Toiletries	15073	24262	41883	46913	50727	54562	57738	61291	66384	74011	81842	91741	97593	8.8%	9.7%	6.4%
Other Chemical Products	7290	15402	24632	27232	25445	25849	28788	28845	27145	29358	32373	32799	31737	2.6%	1.9%	-3.2%
By Use:																
Final Shipments	36744	67698	122534	136199	131084	142965	155991	152584	152197	170231	192389	206259	212346	5.7%	6.8%	3.0%
Intra-Industry Shipments	12451	24012	45686	50710	45170	46587	49972	52206	53514	59315	67309	68928	73266	4.8%	7.0%	6.3%

Sources: Bureau of the Census, CMA analysis

TABLE 2.5
INVENTORIES (MILLION DOLLARS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Manfacturing	101246	159844	261700	279453	307212	307675	334236	329555	317567	332619	361477	377201	382135	3.9%	3.0%	1.3%
Chemicals & Allied Products	6802	12312	19899	22278	24278	24532	26238	25952	25558	26388	29372	30861	32118	4.9%	4.4%	4.1%
By Industry Segment:																
Industrial Chemicals, Except Pigments	3514	6381	10745	12118	13717	13833	14644	13995	13505	13737	15268	16331	16712	4.5%	3.6%	2.3%
Drugs, Soap, and Toiletries	2017	3607	5901	6397	6724	6929	7574	7826	8250	8860	9898	10136	10641	6.1%	6.3%	5.0%
Other Chemical Products	1271	2324	3253	3763	3837	3770	4020	4131	3803	3791	4206	4394	4765	3.9%	2.9%	8.4%
By Type:																
Materials and Supplies	2373	4878	8031	8376	8552	8881	8930	8828	8971	9338	10305	10616	10903	3.1%	4.3%	2.7%
Work in Progress	977	1810	3278	3423	4126	4001	4223	4086	3864	3980	4322	4835	4994	4.3%	4.1%	3.3%
Finished Goods	3452	5624	8590	10479	11600	11650	13085	13038	12723	13070	14745	15410	16221	6.6%	4.5%	5.3%

Source: Bureau of the Census

- At the end of 1990, chemical inventories were only 1.35 times average monthly sales. At the same point in the 1981-82 recession inventories were about 1.43 times sales. At the end of 1990 manufacturing industries inventories were about 1.57 times average monthly sales.

Unlike the inflationary 1970's, prices for chemicals increased steadily only after 1986.

Chart 2.5

Producer Prices

(1982=100)

Source: Bureau of Labor Statistics

Producer prices for chemicals rose an average of 6.3 percent per year from 1986 to 1989. In 1990 the recession put downward pressure on chemical prices until Iraq invaded Kuwait and oil prices shot up. The 1990 index was 123.6 (1982=100). Much of the 0.5% increase in the price of chemicals in 1990 occurred after August as a result of the increase in production costs.

TABLE 2.6
PRODUCER PRICE INDICES (1982=100)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Manufacturing	37.7	58.5	89.3	97.7	100.0	101.0	103.5	104.0	101.7	104.4	109.1	114.3	118.1	2.8%	2.6%	3.3%
Chemicals & Allied Products	35.0	62.0	89.0	98.4	100.0	100.3	102.9	103.7	102.6	106.4	116.3	123.0	123.6	3.3%	3.6%	0.5%
Industrial Chemicals	28.6	58.7	91.9	103.1	100.0	97.3	96.8	96.0	91.5	95.5	106.8	114.8	113.2	2.1%	3.4%	-1.4%
Plastic Resins and Materials	32.0	63.8	98.5	102.0	100.0	102.4	108.9	107.5	104.4	110.3	132.4	133.9	124.0	2.3%	2.9%	-7.4%
Drugs and Pharmaceuticals	48.1	60.3	83.1	92.1	100.0	107.7	114.2	122.2	129.9	139.1	148.4	160.0	170.8	7.5%	6.9%	6.8%
Agricultural Chemicals	30.3	69.3	87.9	97.5	100.0	96.0	97.4	96.2	94.2	96.4	104.5	108.7	107.4	2.0%	2.2%	-1.2%
Other Chemicals & Allied Products	40.2	62.4	83.1	94.1	100.0	101.3	102.7	105.2	105.8	107.0	111.9	117.3	118.9	3.6%	2.5%	1.4%

Source: Bureau of Labor Statistics

TABLE 2.7
CHEMICAL INDUSTRY REVENUES AND INCOME (MILLION DOLLARS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Revenues	n/a	88168	163153	188821	186375	201319	209627	202804	205778	225200	261616	278300	286897	5.8%	7.2%	3.1%
Depreciation and Amortization	n/a	3279	5959	7058	7943	8586	8936	9195	10024	9911	11027	12104	12913	8.0%	7.0%	6.7%
Other Operating Costs and Expenses	n/a	74845	143186	165546	166509	178269	183729	180411	180251	195992	225361	240436	248434	5.7%	6.6%	3.3%
Income (or Loss) from Operations	n/a	10044	14008	16215	11924	14465	16960	13199	15503	19297	25229	25759	25550	6.2%	14.1%	-0.8%
Nonoperating Income	n/a	774	3070	2722	2150	2236	2860	394	4556	6271	8321	8130	7259	9.0%	79.1%	-10.7%
Income Before Income Taxes	n/a	10818	17078	18937	14074	16702	19820	13592	20059	25566	33551	33889	32811	6.7%	19.3%	-3.2%
Income Taxes	n/a	4115	5316	5964	3750	5059	5937	4051	7158	9007	9899	9367	9444	5.9%	18.4%	0.8%
Income After Taxes	n/a	6703	11762	12973	10324	11643	13883	9541	12901	16559	23652	24522	23367	7.1%	19.6%	-4.7%

Source: Bureau of the Census

- According to the Bureau of Census, the chemical industry paid $9.4 billion in taxes in 1990. The chemical industry paid more income taxes in 1990 than any other manufacturing industry including petroleum and transportation equipment. Taxes took 29% of pre-tax income in 1990.

TABLE 2.8
CHEMICAL INDUSTRY ASSETS (MILLION DOLLARS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Cash and Securities	n/a	5250	5359	6880	7027	8187	9133	9840	11033	11452	12887	12408	11228	7.7%	2.7%	-9.5%
Receivables	n/a	11998	24114	25482	25135	27407	26886	28404	27651	32898	37614	39103	41156	5.5%	7.7%	5.3%
Inventories	n/a	14332	24149	28180	27098	26967	28261	28607	28081	31265	34731	35688	37387	4.5%	5.5%	4.8%
Other Current Assets	n/a	2417	4216	4580	5858	5712	6571	7190	8916	10306	11717	12209	14129	12.9%	14.5%	15.7%
Total Current Assets	n/a	33997	57838	65122	65118	68273	70851	74041	75681	85921	96949	99408	103900	6.0%	7.0%	4.5%
Depreciable and Amortizable Fixed Assets	n/a	57224	99888	109632	122051	128255	133358	137197	138686	149417	160452	175430	191418	6.7%	6.9%	9.1%
Land and Mineral Rights	n/a	2171	4716	5854	7930	7873	6783	6350	6211	6295	9044	7443	12631	10.4%	14.7%	69.7%
Accumulated Depreciation and Amortization	n/a	27622	45816	47963	53169	57851	62860	66381	67350	72946	76660	82654	89598	6.9%	6.2%	8.4%
Net Property, Plant & Equipment	n/a	31773	58788	67523	76813	78277	77281	77166	77547	82766	92835	100219	114452	6.9%	8.2%	14.2%
Other Non-Current Assets	n/a	15343	32270	38866	40073	41022	44957	54132	63938	75759	87798	93690	106168	12.6%	14.4%	13.3%
Total Assets	n/a	81113	148896	171511	182004	187572	193089	205339	217166	244446	277582	293317	324520	8.1%	9.6%	10.6%

Source: Bureau of the Census

TABLE 2.9
CHEMICAL INDUSTRY LIABILITIES (MILLION DOLLARS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Current Liabilities	n/a	14461	31671	34270	36421	40896	44759	50229	50898	60422	67563	73620	77803	9.4%	9.1%	5.7%
Long-Term Debt & Other Liabilities	n/a	20961	37684	47387	50289	49494	48010	54787	65468	77142	89490	91903	108113	11.1%	14.6%	17.6%
Total Liabilities	n/a	35422	69355	81657	86710	90390	92769	105016	116366	137564	157053	165523	185916	10.4%	12.1%	12.3%
Shareholders' Equity	n/a	45691	79541	89855	95294	97182	100321	100323	100801	106882	120530	127794	138605	5.7%	6.7%	8.5%
Total Liabilities and Shareholder's Equity	n/a	81113	148896	171511	182004	187572	193089	205339	217166	244446	277582	293317	324520	8.1%	9.6%	10.6%

Source: Bureau of the Census

TABLE 2.10
CHEMICAL INDUSTRY FINANCIAL RATIOS

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Profitability:													
Operating Margin	n/a	11.4%	8.6%	8.6%	6.4%	7.2%	8.1%	6.5%	7.5%	8.6%	9.6%	9.3%	8.9%
Return on Sales	n/a	7.6%	7.2%	6.9%	5.5%	5.8%	6.6%	4.7%	6.3%	7.4%	9.0%	8.8%	8.1%
Return on Assets	n/a	8.3%	7.9%	7.6%	5.7%	6.2%	7.2%	4.6%	5.9%	6.8%	8.5%	8.4%	7.2%
Return on Equity	n/a	14.7%	14.8%	14.4%	10.8%	12.0%	13.8%	9.5%	12.8%	15.5%	19.6%	19.2%	16.9%
Solvency and Liquidity:													
Debt/Equity Ratio	n/a	0.78	0.87	0.91	0.91	0.93	0.92	1.05	1.15	1.29	1.30	1.30	1.34
Current Ratio	n/a	2.35	1.83	1.90	1.79	1.67	1.58	1.47	1.49	1.42	1.43	1.35	1.34
Quick Ratio	n/a	1.36	1.06	1.08	1.04	1.01	0.95	0.90	0.94	0.90	0.92	0.87	0.85
Debt Ratio	n/a	0.44	0.47	0.48	0.48	0.48	0.48	0.51	0.54	0.56	0.57	0.56	0.57
Inventory Turnover	n/a	6.15	6.76	6.70	6.88	7.47	7.42	7.09	7.33	7.20	7.53	7.80	7.67
Working Capital Turnover	n/a	2.59	2.82	2.90	2.86	2.95	2.96	2.74	2.72	2.62	2.70	2.80	2.76
Fixed Asset Turnover	n/a	2.77	2.78	2.80	2.43	2.57	2.71	2.63	2.65	2.72	2.82	2.78	2.51
Total Asset Turnover	n/a	1.09	1.10	1.10	1.02	1.07	1.09	0.99	0.95	0.92	0.94	0.95	0.88

Source: Bureau of the Census, CMA analysis

TABLE 2.11
INORGANIC CHEMICALS PRODUCTION (THOUSAND TONS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Aluminum Sulfate	1191	1141	1286	1294	1154	1120	1239	1204	1213	1226	1237	1244	1210	-0.6%	0.1%	-2.7%
Caustic Soda (Sodium Hydroxide)	10141	9635	11606	10621	9385	10039	10914	10790	10405	11553	10533	10492	11690	0.1%	1.6%	11.4%
Chlorine	9764	9167	11421	10763	9176	9864	10700	10402	10442	11078	11257	11413	10945	-0.4%	1.0%	-4.1%
Hydrochloric Acid	2014	2009	2888	2574	2450	2468	2693	2803	2392	2996	3228	3177	2340	-2.1%	-3.5%	-26.3%
Hydrogen Peroxide	61	80	116	111	108	117	139	144	152	153	168	204	205	5.9%	7.3%	0.5%
Phosphorous, Elemental	597	450	432	426	361	366	386	359	364	344	343	353	355	-1.9%	-0.2%	0.6%
Sodium Silicate, Anhydrous	628	724	786	771	664	710	685	692	791	952	812	833	880	1.1%	4.9%	5.6%
Sodium Sulfate	1373	1227	1139	1111	864	914	901	811	841	799	819	755	735	-4.3%	-1.9%	-2.6%
Sodium Tripolyphosphate	1208	770	789	696	651	669	692	612	617	586	549	580	530	-3.9%	-2.8%	-8.6%
Sulfuric Acid	29525	32360	44157	40742	33233	37459	41893	39890	35993	39256	42580	43301	44280	0.0%	2.1%	2.3%
Titanium Dioxide	655	603	727	761	660	760	835	864	924	968	1022	1101	1080	4.0%	4.6%	-1.9%

Source: Bureau of the Census

TABLE 2.12
ORGANIC CHEMICALS PRODUCTION (MILLION POUNDS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Acetic Acid	1932	2197	2977	2705	2748	2807	2619	2897	2728	3246	3159	3294	3755	2.3%	5.3%	14.0%
Acetone	1615	1640	2076	2144	1693	1859	1862	1788	1910	1845	2303	2524	2220	0.7%	4.4%	-12.0%
Acrylonitrile	1039	1215	1830	1996	2035	2146	2219	2349	2182	2452	2609	2362	2895	4.7%	4.3%	22.6%
Aniline	398	407	659	634	557	663	786	716	824	859	1029	1016	945	3.7%	5.7%	-7.0%
Benzene	7675	7019	11227	9573	7700	8435	8530	8251	8860	10589	11627	11936	12120	0.8%	8.0%	1.5%
Bisphenol A	202	293	530	555	480	643	762	949	956	1000	1340	1242	1140	8.0%	3.7%	-8.2%
Butadiene (1,3-)	3101	2597	2799	2986	1915	2353	2827	2340	2546	2931	3169	3121	3155	1.2%	6.2%	1.1%
Caprolactum	500	713	910	928	793	976	1027	1089	1109	1156	1261	1307	1380	4.3%	4.9%	5.6%
Chloroform	240	262	353	405	299	362	405	275	422	462	524	588	505	3.6%	12.9%	-14.1%
Cumene	1993	2003	3459	3309	2743	3345	3754	2627	3745	4105	4455	4426	4310	2.2%	10.4%	-2.6%
Cyclohexane	1841	1734	1964	1820	1275	1656	1994	1657	2070	2276	2297	2273	2465	2.3%	8.3%	8.4%
Diethylene Glycol	341	323	382	364	394	463	535	441	490	436	563	435	500	2.7%	2.5%	14.9%
Ethanolamines	264	258	376	429	416	468	504	537	543	627	608	667	680	6.1%	4.8%	1.9%
Ethyl Acetate	161	171	234	277	235	213	210	192	199	214	254	292	275	1.6%	7.4%	-5.8%
Ethylbenzene	4827	4822	7642	7813	6656	7876	7562	7386	9020	9346	9929	9236	8370	0.9%	2.5%	-9.4%
Ethylene	18089	20499	28667	29418	24501	28680	31383	29847	32859	34951	37204	34988	37475	2.7%	4.7%	7.1%
Ethylene Dichloride	7460	7977	11108	9974	7619	11506	10710	12101	12940	12197	13028	13383	14585	2.8%	3.8%	9.0%
Ethylene Glycol	3038	3809	4386	4143	4309	4425	3224	4178	4770	5183	5517	5461	5025	1.4%	3.8%	-8.0%
Ethylene Oxide	3865	4467	5220	4937	4987	5534	5699	5430	5430	4785	5953	5031	5580	0.7%	0.5%	10.9%
Formaldehyde	4427	4558	5555	5721	4817	5465	5815	5606	5549	5733	6280	5893	6410	1.4%	2.7%	8.8%
Isopropyl Alcohol	1919	1521	1836	1669	1380	1209	1394	1235	1301	1371	1389	1474	1380	-2.8%	2.2%	-6.4%
Maleic Anhydride	215	216	304	293	260	299	359	394	359	382	448	475	420	3.3%	1.3%	-11.6%
Methanol	4932	5176	7153	8577	7556	7982	8186	5003	7205	7537	7345	8167	7985	1.1%	9.8%	-2.2%
Methyl Chloride	423	366	362	405	366	409	482	415	605	373	428	461	500	3.3%	3.8%	8.5%
Methyl Chloroform	366	459	692	614	595	586	675	869	652	694	724	783	805	1.5%	-1.5%	2.8%
Methyl Ethyl Ketone	480	425	587	611	468	531	543	537	600	672	482	450	475	-2.1%	-2.4%	5.6%
Methyl Methacrylate	445	546	780	891	721	844	917	858	943	1029	1100	1161	1205	4.4%	7.0%	3.8%
Methylene Chloride	402	497	564	592	532	584	607	467	566	516	504	482	470	-1.8%	0.1%	-2.5%
Perchloroethylene	707	679	765	691	585	547	573	678	414	473	498	481	385	-6.6%	-10.7%	-20.0%
Phenol	1708	1746	2568	2578	2175	2638	2889	2841	3115	3841	3562	3806	3510	3.2%	4.3%	-7.8%
Phthalic Anhydride	734	702	818	870	684	838	870	820	864	1035	999	917	940	1.4%	2.8%	2.5%
Propylene	6641	8709	13675	13482	12535	13959	15559	14887	16522	19019	21224	20572	22235	5.0%	8.4%	8.1%
Propylene Glycol	428	391	488	473	400	484	462	500	573	747	840	805	800	5.1%	9.9%	-0.6%
Styrene	4335	4673	6856	6679	5942	6802	7709	7622	7888	8014	8984	8337	8015	1.6%	1.0%	-3.9%
Terephthalic Acid, Dimethyl Ester	1447	4614	6054	6235	4843	5626	5912	6490	6257	7601	10234	8426	7680	2.4%	3.5%	-8.7%
Toluene	4612	4464	5624	4599	4162	4393	4463	4008	4408	6206	6299	5809	7005	2.2%	11.8%	20.6%
Vinyl Acetate	803	1290	1921	1936	1876	1963	2024	2112	1710	1813	2561	2553	2545	2.9%	3.8%	-0.3%
Vinyl Chloride	4040	4916	6466	6874	4902	6875	6085	9463	8439	8402	9058	10135	10650	5.1%	2.4%	5.1%
o-Xylene	799	703	995	918	802	781	688	675	788	940	971	983	945	-0.5%	7.0%	-3.9%
p-Xylene	1590	2484	4238	4532	3391	4114	4264	4779	5035	5155	5601	5345	5200	2.1%	1.7%	-2.7%

Source: United States International Trade Commission

TABLE 2.13
PLASTIC RESINS PRODUCTION (MILLION POUNDS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Phenolic Resins	1186	1275	1745	1688	1398	1460	1656	1714	1520	1697	1687	1838	1885	0.8%	1.9%	2.6%
Polyamide Resins	108	144	315	339	264	348	386	409	477	634	656	714	725	8.7%	12.1%	1.5%
Polyethylene and Copolymers	5844	7483	11720	12604	12548	13890	14621	15318	16218	17378	18694	16135	18850	4.9%	4.2%	16.8%
Polypropylene	1031	1903	3699	4008	3515	4457	5216	5654	5835	6978	7258	6701	7770	7.7%	6.6%	16.0%
Polystyrene and Copolymers	3550	3877	5540	5915	5609	6254	6857	7229	5794	8283	9185	7918	7460	3.0%	0.6%	-5.8%
Polyvinyl Chloride and Copolymers	3756	3965	5485	5618	5397	6256	6828	6668	7499	8339	8588	8824	9070	5.2%	6.3%	2.8%

Source: United States International Trade Commission

TABLE 2.14
INDUSTRIAL GASES PRODUCTION (MILLION CUBIC FEET)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Acetylene	14834	6704	5493	5172	3824	3901	4974	4972	4971	5284	5297	5445	5335	-0.3%	1.4%	-2.0%
Hydrogen	59654	73552	106562	104817	88131	103354	112790	121243	136478	149217	177008	207806	187930	5.8%	9.2%	-9.6%
Nitrogen	151191	252368	479240	489666	482726	560124	651654	603707	677474	675843	722013	744068	791020	5.1%	5.6%	6.3%
Oxygen	329729	352554	430977	430616	348814	345881	386615	356511	383267	402644	451999	451802	470580	0.9%	5.7%	4.2%

Source: Bureau of the Census

TABLE 2.15
INORGANIC FERTILIZER PRODUCTION (THOUSAND TONS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Ammonia, Synthetic Anhydrous	13824	16419	19653	19045	15081	13952	16702	17319	14488	16098	16821	16362	16960	-1.5%	-0.4%	3.7%
Ammonium Nitrate	6456	7088	9127	8861	7091	6240	7165	7149	6091	6547	7504	7871	7105	-2.5%	-0.1%	-9.7%
Ammonium Sulfate	1894	2106	2136	2185	1769	1956	2067	2093	2080	2189	2333	2347	2495	1.6%	3.6%	6.3%
Nitric Acid	7603	7527	9232	9093	7390	6968	7798	7645	6736	7225	7991	8349	7750	-1.7%	0.3%	-7.2%
Nitrogen Solutions	1721	2068	2773	3099	2786	2605	2894	2656	2275	2385	2902	2880	2555	-0.8%	-0.8%	-11.3%
Phosphoric Acid	5683	7677	10848	9958	8253	9767	11394	10607	9578	10599	11659	11737	12175	1.2%	2.8%	3.7%

Source: Bureau of the Census

Section 3
U.S. International Trade

The increase in world chemical production has brought with it an even larger increase in international chemical trade. Most chemicals are now manufactured in many production locations around the globe. World exports of chemicals exceeded $280 billion in 1990. World trade in chemicals reflects an intensely competitive struggle for markets by the producers in a "globalized" industry.

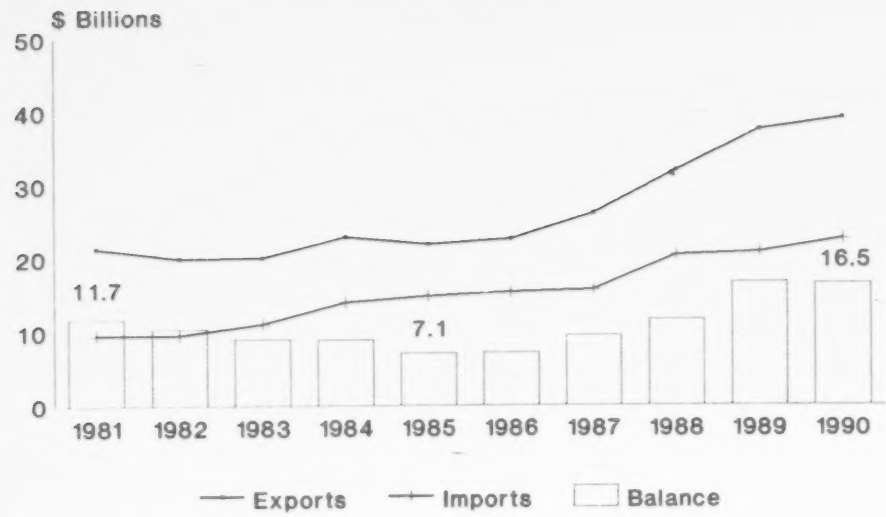
The U.S. chemical industry began a limited export trade in potash and naval stores with the United Kingdom as early as the 18th century. In 1990, exports of U.S.-produced chemicals reached $39 billion, over 13.5% of total world chemical exports, and an amount equal to total U.S. agricultural exports. The U.S. chemical industry competes in a global context and has become increasingly dependent for its share of international markets on unique products in which it enjoys a distinct technological advantage. Canada represents the largest single national market for U.S. chemical exports, closely followed by Japan. Western Europe, Latin America, and Asia are other large markets.

U.S. imports of chemicals have also increased, reaching $22.5 billion in 1990. Canada is by far the largest exporter of chemicals to the United States, about $4.3 billion in 1990. The U.S. chemical industry has traditionally maintained trade surpluses, even during the second half of the 1980s, a period when the overall U.S. deficit in merchandise trade was often over $100 billion per year. In 1990, the U.S. trade surplus in chemicals reached $16.5 billion, including a $2.2 billion trade surplus with Japan.

The U.S. trade statistics in this section are compiled by the U.S. Department of Commerce and are presented in Standard International Trade Classification Revision 3 format. Exports are domestic exports only, valued free along ship (F.A.S.). Imports are general imports at customs value, which excludes insurance and freight. In 1990, the Bureau of the Census adjusted its export statistics for 1989 to reflect under-reported exports to Canada and other changes. As a result, the originally reported chemicals trade balance of $15.7 billion was revised to $16.6 billion. The trade surplus data in Table 1.1 and Chart 3.1 reflect the adjustment. The trade data at more detailed levels, however, were not revised by the Census Bureau. As a result, the data in the Section 3 tables do not include the adjustment.

Since the mid-1980's, the chemical industry's trade surplus has steadily expanded, reaching a record high in 1989, but falling slightly in 1990 to its second best high.

Chart 3.1
U.S. Chemical Trade
1981-90



Chemical exports rose by an average of 18.5% per year from 1986 to 1989. However, export growth slowed in 1990, increasing by 4.3%. In 1990 chemical exports were $39 billion, almost identical to U.S. agricultural exports. In 1990, the foreign earnings of U.S. chemical companies and the chemical trade surplus added over $19 billion to U.S. international accounts.

TABLE 3.1
SUMMARY OF U.S. CHEMICAL TRADE (MILLION DOLLARS)

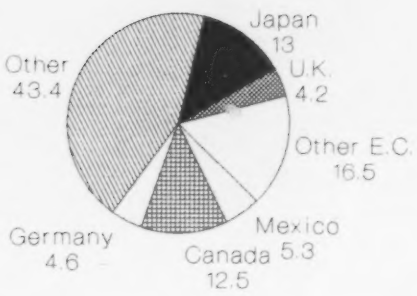
Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/85	1990/89
Total Chemicals & Related Products	Exports	19967	22830	21829	22522	26023	31909	36485	38983	12.3%	6.8%
	Imports	10945	13920	14715	15302	16567	20326	20752	22468	8.8%	8.3%
	Balance	9021	8910	7113	7220	9455	11583	15733	16515		
51 Organic Chemicals	Exports	5349	6111	5997	6423	7717	9704	10609	10400	11.6%	-2.0%
	Imports	3503	4338	4765	4883	5508	7250	7042	7392	9.2%	5.0%
	Balance	1846	1773	1232	1539	2209	2454	3567	3008		
52 Inorganic Chemicals	Exports	2966	3506	3625	3683	3789	4289	4319	3816	1.0%	-11.6%
	Imports	2301	3111	3029	2930	2668	3147	3231	3234	1.3%	0.1%
	Balance	665	395	596	753	1121	1142	1088	582		
53 Dyeing, Tanning and Coloring	Exports	715	731	685	767	952	1100	1097	1588	18.3%	44.8%
	Imports	644	803	855	1069	1267	1302	1133	1288	8.6%	13.7%
	Balance	71	-72	-170	-303	-314	-202	-37	300		
54 Medicinal and Pharmaceutical Products	Exports	2217	2316	2418	2662	2718	3262	3660	4103	11.2%	12.1%
	Imports	812	1036	1129	1231	1509	1849	2086	2500	17.2%	19.9%
	Balance	1405	1280	1288	1431	1209	1413	1574	1603		
55 Essential Oils and Perfume Materials	Exports	795	813	772	809	951	1126	1469	1963	20.5%	33.6%
	Imports	452	629	737	876	982	1175	1165	1323	12.4%	13.6%
	Balance	344	183	35	-67	-31	-50	304	639		
56 Fertilizers, Manufactured	Exports	1332	2203	1750	929	1084	1199	2821	2575	8.0%	-8.7%
	Imports	977	1115	945	837	768	991	999	955	0.2%	-4.4%
	Balance	355	1089	805	92	317	208	1822	1619		
57 Plastics in Primary Form	Exports	2737	2926	2730	3121	4033	5503	5727	6429	18.7%	12.2%
	Imports	541	777	861	1006	1113	1373	1687	1974	18.1%	17.0%
	Balance	2197	2149	1869	2114	2920	4130	4040	4454		
58 Plastics in Non-Primary Form	Exports	1247	1374	1272	1387	1660	2001	2202	2633	15.7%	19.6%
	Imports	754	956	1009	1171	1327	1574	1629	1773	11.9%	8.8%
	Balance	493	419	263	216	333	426	572	860		
59 Chemical Materials & Products	Exports	2608	2849	2581	2742	3118	3725	4583	5478	16.2%	19.5%
	Imports	962	1156	1385	1298	1425	1665	1780	2028	7.9%	14.0%
	Balance	1646	1693	1196	1444	1693	2060	2803	3450		

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

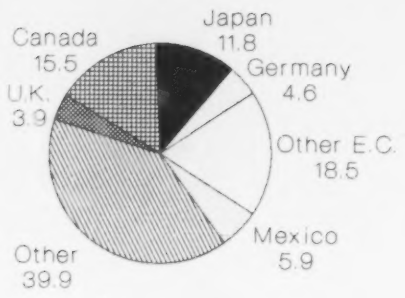
Chart 3.2
U.S. EXPORTS
(Percent of Total)

Country of Destination

1983

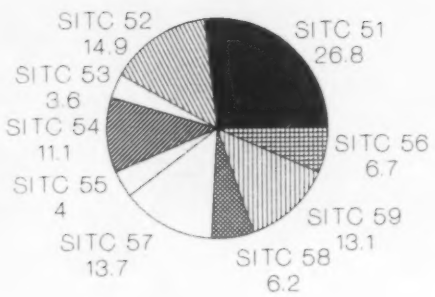


1990

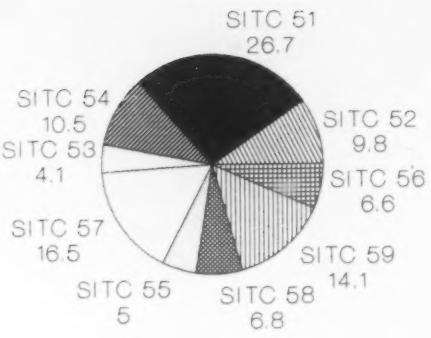


Product Composition

1983



1990

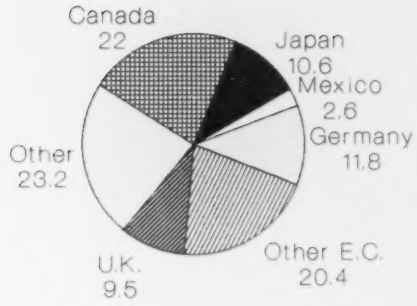


The European Community was the largest regional importer of U.S. produced chemicals in 1990. Individually, Canada and Japan were first and second respectively. Organic chemicals (SITC 51) is the largest export category followed by plastics. The plastics share of chemical exports (SITC 57 and SITC 58) increased by 3.4 percentage points between 1983 and 1990.

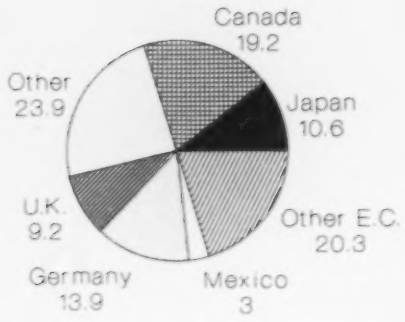
Chart 3.3
U.S. IMPORTS
(Percent of Total)

Country of Origin

1983

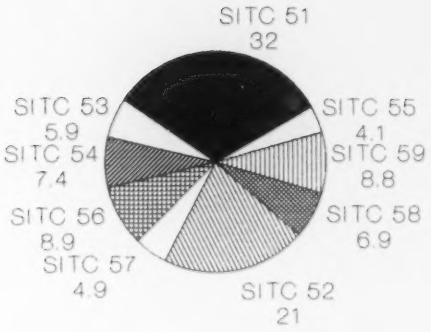


1990

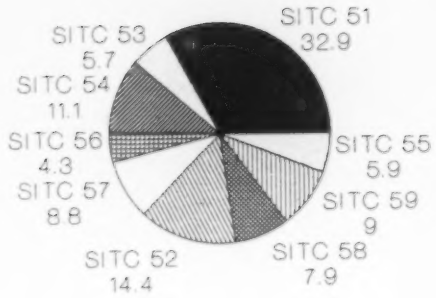


Product Composition

1983



1990



The European Community was also the largest regional exporter of chemicals to the U.S. The U.S. chemical industry had positive trade balances with Japan ($2.2 billion), Canada ($1.7 billion), Mexico ($1.4 billion), and most other countries. Germany, the U.K., France, and Eastern Europe exported more to the U.S. than they imported from it.

TABLE 3.2
SUMMARY OF U.S. CHEMICAL TRADE (PERCENT OF TOTAL)

Item/Year		1983	1984	1985	1986	1987	1988	1989	1990
51 Organic Chemicals	Exports	26.8%	26.8%	27.5%	28.5%	29.7%	30.4%	29.1%	26.7%
	Imports	32.0%	31.2%	32.4%	31.9%	33.2%	35.7%	33.9%	32.9%
52 Inorganic Chemicals	Exports	14.9%	15.4%	16.6%	16.4%	14.6%	13.4%	11.8%	9.8%
	Imports	21.0%	22.4%	20.6%	19.1%	16.1%	15.5%	15.6%	14.4%
53 Dyeing, Tanning and Coloring	Exports	3.6%	3.2%	3.1%	3.4%	3.7%	3.4%	3.0%	4.1%
	Imports	5.9%	5.8%	5.8%	7.0%	7.6%	6.4%	5.5%	5.7%
54 Medicinal and Pharmaceutical Products	Exports	11.1%	10.1%	11.1%	11.8%	10.4%	10.2%	10.0%	10.5%
	Imports	7.4%	7.4%	7.7%	8.0%	9.1%	9.1%	10.1%	11.1%
55 Essential Oils and Perfume Materials	Exports	4.0%	3.6%	3.5%	3.6%	3.7%	3.5%	4.0%	5.0%
	Imports	4.1%	4.5%	5.0%	5.7%	5.9%	5.8%	5.6%	5.9%
56 Fertilizers, Manufactured	Exports	6.7%	9.7%	8.0%	4.1%	4.2%	3.8%	7.7%	6.6%
	Imports	8.9%	8.0%	6.4%	5.5%	4.6%	4.9%	4.8%	4.3%
57 Plastics in Primary Form	Exports	13.7%	12.8%	12.5%	13.9%	15.5%	17.2%	15.7%	16.5%
	Imports	4.9%	5.6%	5.9%	6.6%	6.7%	6.8%	8.1%	8.8%
58 Plastics in Non-Primary Form	Exports	6.2%	6.0%	5.8%	6.2%	6.4%	6.3%	6.0%	6.8%
	Imports	6.9%	6.9%	6.9%	7.6%	8.0%	7.7%	7.9%	7.9%
59 Chemical Materials & Products	Exports	13.1%	12.5%	11.8%	12.2%	12.0%	11.7%	12.6%	14.1%
	Imports	8.8%	8.3%	9.4%	8.5%	8.6%	8.2%	8.6%	9.0%
Total Selected Commodities	Exports	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Imports	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.3
U.S. EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 5 TOTAL, CHEMICALS AND RELATED PRODUCTS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	2576	12.9%	2857	12.5%	2714	12.4%	2613	11.6%	3221	12.4%	3751	11.8%	4210	11.5%	6050	15.5%
Japan	2603	13.0%	3000	13.1%	2914	13.3%	3062	13.6%	3401	13.1%	3982	12.5%	4664	12.8%	4582	11.8%
United Kingdom	842	4.2%	921	4.0%	837	3.8%	910	4.0%	1087	4.2%	1367	4.3%	1554	4.3%	1527	3.9%
Germany	916	4.6%	1078	4.7%	1056	4.8%	1177	5.2%	1177	4.5%	1369	4.3%	1515	4.2%	1775	4.6%
Netherlands	941	4.7%	1066	4.7%	1204	5.5%	1184	5.3%	1488	5.7%	1685	5.3%	2033	5.6%	2190	5.6%
France	488	2.4%	594	2.6%	665	3.0%	718	3.2%	729	2.8%	833	2.6%	931	2.6%	1107	2.8%
Italy	354	1.8%	388	1.7%	438	2.0%	482	2.1%	560	2.2%	638	2.0%	731	2.0%	805	2.1%
Other E.C.	1519	7.6%	1762	7.7%	1710	7.8%	1800	8.0%	2045	7.9%	2426	7.6%	2994	8.2%	3105	8.0%
Total E.C.	5059	25.3%	5810	25.4%	5911	27.1%	6271	27.8%	7085	27.2%	8318	26.1%	9758	26.7%	10510	27.0%
Other Developed	1887	9.5%	1954	8.6%	1797	8.2%	1674	7.4%	1906	7.3%	2327	7.3%	2858	7.8%	2687	6.9%
Total Developed	12125	60.7%	13620	59.7%	13336	61.1%	13620	60.5%	15612	60.0%	18378	57.6%	21490	58.9%	23829	61.1%
Saudi Arabia	273	1.4%	255	1.1%	203	0.9%	180	0.8%	220	0.8%	239	0.7%	213	0.6%	249	0.6%
Other OPEC	846	4.2%	1029	4.5%	869	4.0%	898	4.0%	1074	4.1%	1282	4.0%	1162	3.2%	1260	3.2%
Total OPEC	1119	5.6%	1283	5.6%	1072	4.9%	1078	4.8%	1294	5.0%	1521	4.8%	1375	3.8%	1509	3.9%
Brazil	472	2.4%	546	2.4%	489	2.2%	738	3.3%	655	2.5%	644	2.0%	774	2.1%	897	2.3%
Mexico	1055	5.3%	1255	5.5%	1408	6.4%	1261	5.6%	1431	5.5%	1836	5.8%	2195	6.0%	2298	5.9%
Other Latin America	2059	10.3%	2364	10.4%	2031	9.3%	2210	9.8%	2513	9.7%	2954	9.3%	2949	8.1%	3037	7.8%
Total Latin America	3585	18.0%	4164	18.2%	3927	18.0%	4209	18.7%	4599	17.7%	5433	17.0%	5918	16.2%	6232	16.0%
South Korea	524	2.6%	675	3.0%	598	2.7%	749	3.3%	983	3.8%	1373	4.3%	1642	4.5%	1690	4.3%
Singapore	286	1.4%	294	1.3%	253	1.2%	302	1.3%	371	1.4%	481	1.5%	648	1.8%	690	1.8%
Taiwan	690	3.5%	694	3.0%	542	2.5%	832	3.7%	1115	4.3%	1516	4.8%	1751	4.8%	1529	3.9%
Other Asian NICS	271	1.4%	316	1.4%	344	1.6%	389	1.7%	562	2.2%	829	2.6%	692	1.9%	746	1.9%
Total Asian NICS	1771	8.9%	1979	8.7%	1737	8.0%	2273	10.1%	3031	11.6%	4199	13.2%	4733	13.0%	4656	11.9%
Other Developing Countries	1073	5.4%	1406	6.2%	1371	6.3%	1096	4.9%	1121	4.3%	1582	5.0%	2031	5.6%	2013	5.2%
Total Developing Countries	7110	35.6%	8188	35.9%	7569	34.7%	8081	35.9%	9306	35.8%	11881	37.2%	13450	36.9%	13762	35.3%
China	353	1.8%	645	2.8%	507	2.3%	422	1.9%	748	2.9%	1308	4.1%	1136	3.1%	1054	2.7%
USSR	305	1.5%	266	1.2%	318	1.5%	294	1.3%	282	1.1%	277	0.9%	332	0.9%	280	0.7%
Eastern Europe	67	0.3%	101	0.4%	90	0.4%	94	0.4%	65	0.3%	59	0.2%	77	0.2%	58	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.0%	0	0.0%	0	0.0%
Total CPE	724	3.6%	1012	4.4%	915	4.2%	810	3.6%	1095	4.2%	1644	5.2%	1545	4.2%	1392	3.6%
World	19967	100.0%	22830	100.0%	21829	100.0%	22522	100.0%	26023	100.0%	31909	100.0%	36485	100.0%	38983	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.4
U.S. IMPORTS BY COUNTRY OF ORIGIN (MILLION DOLLARS)
SITC 5 TOTAL, CHEMICALS AND RELATED PRODUCTS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	2408	22.0%	3110	22.3%	2882	19.6%	2783	18.2%	3074	18.6%	3841	18.9%	3934	19.0%	4305	19.2%
Japan	1155	10.6%	1408	10.1%	1526	10.4%	1922	12.6%	2301	13.9%	2399	11.8%	2373	11.4%	2391	10.6%
United Kingdom	1036	9.5%	1296	9.3%	1235	8.4%	1529	10.0%	1503	9.1%	2126	10.5%	2030	9.8%	2072	9.2%
Germany	1295	11.8%	1646	11.8%	1559	10.6%	1907	12.5%	2236	13.5%	2674	13.2%	2828	13.6%	3117	13.9%
Netherlands	472	4.3%	522	3.8%	682	4.6%	558	3.6%	581	3.5%	726	3.6%	711	3.4%	767	3.4%
France	889	8.1%	1186	8.5%	1466	10.0%	1258	8.2%	1443	8.7%	1606	7.9%	1502	7.2%	1541	6.9%
Italy	323	3.0%	456	3.3%	588	4.0%	517	3.4%	639	3.9%	747	3.7%	722	3.5%	799	3.6%
Other E.C.	549	5.0%	765	5.5%	805	5.5%	795	5.2%	931	5.6%	1187	5.8%	1365	6.6%	1433	6.4%
Total E.C.	4565	41.7%	5870	42.2%	6335	43.1%	6563	42.9%	7333	44.3%	9066	44.6%	9158	44.1%	9729	43.3%
Other Developed	1011	9.2%	1111	8.0%	1351	9.2%	1492	9.7%	1359	8.2%	1744	8.6%	1755	8.5%	2037	9.1%
Total Developed	9139	83.5%	11500	82.6%	12094	82.2%	12760	83.4%	14067	84.9%	17050	83.9%	17221	83.0%	18462	82.2%
Saudi Arabia	1	0.0%	1	0.0%	40	0.3%	81	0.5%	56	0.3%	83	0.4%	95	0.5%	87	0.4%
Other OPEC	200	1.8%	54	0.4%	63	0.4%	72	0.5%	75	0.5%	93	0.5%	91	0.4%	83	0.4%
Total OPEC	201	1.8%	55	0.4%	103	0.7%	153	1.0%	131	0.8%	176	0.9%	187	0.9%	171	0.8%
Brazil	241	2.2%	409	2.9%	408	2.8%	274	1.8%	230	1.4%	340	1.7%	315	1.5%	306	1.4%
Mexico	287	2.6%	509	3.7%	451	3.1%	330	2.2%	393	2.4%	567	2.8%	582	2.8%	665	3.0%
Other Latin America	494	4.5%	413	3.0%	437	3.0%	450	2.9%	441	2.7%	639	3.1%	775	3.7%	795	3.5%
Total Latin America	1022	9.3%	1330	9.6%	1297	8.8%	1054	6.9%	1064	6.4%	1546	7.6%	1671	8.1%	1766	7.9%
South Korea	58	0.5%	80	0.6%	90	0.6%	135	0.9%	152	0.9%	188	0.9%	185	0.9%	253	1.1%
Singapore	8	0.1%	18	0.1%	68	0.5%	123	0.8%	144	0.9%	159	0.8%	176	0.8%	379	1.7%
Taiwan	183	1.7%	221	1.6%	238	1.6%	283	1.8%	308	1.9%	336	1.7%	349	1.7%	350	1.6%
Other Asian NICS	9	0.1%	17	0.1%	20	0.1%	26	0.2%	29	0.2%	35	0.2%	34	0.2%	43	0.2%
Total Asian NICS	257	2.4%	337	2.4%	416	2.8%	567	3.7%	633	3.8%	718	3.5%	744	3.6%	1024	4.6%
Other Developing Countries	168	1.5%	253	1.8%	290	2.0%	302	2.0%	336	2.0%	438	2.2%	480	2.3%	519	2.3%
Total Developing Countries	1484	13.6%	1944	14.0%	2085	14.2%	2042	13.3%	2140	12.9%	2827	13.9%	3050	14.7%	3427	15.3%
China	126	1.2%	151	1.1%	157	1.1%	174	1.1%	196	1.2%	230	1.1%	273	1.3%	337	1.5%
USSR	144	1.3%	207	1.5%	196	1.3%	163	1.1%	93	0.6%	116	0.6%	108	0.5%	163	0.7%
Eastern Europe	53	0.5%	117	0.8%	183	1.2%	163	1.1%	72	0.4%	103	0.5%	100	0.5%	80	0.4%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	323	3.0%	475	3.4%	536	3.6%	500	3.3%	361	2.2%	449	2.2%	481	2.3%	580	2.6%
World	10945	100.0%	13920	100.0%	14715	100.0%	15302	100.0%	16567	100.0%	20326	100.0%	20752	100.0%	22468	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.5
TRADE BALANCE (MILLION DOLLARS)
SITC 5 TOTAL, CHEMICALS AND RELATED PRODUCTS

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990
Canada	168	-254	-168	-170	147	-90	276	1745
Japan	1447	1591	1388	1140	1100	1582	2291	2191
United Kingdom	-195	-375	-398	-618	-416	-759	-476	-545
Germany	-379	-567	-502	-730	-1059	-1305	-1313	-1341
Netherlands	469	544	522	626	907	959	1322	1423
France	-401	-592	-801	-541	-714	-773	-571	-434
Italy	31	-67	-150	-35	-79	-109	8	6
Other E.C.	970	997	905	1006	1114	1240	1629	1672
Total E.C.	495	-60	-424	-292	-248	-748	599	781
Other Developed	876	842	446	183	546	583	1103	650
Total Developed	2986	2120	1242	861	1545	1327	4270	5367
Saudi Arabia	271	253	163	99	164	156	117	161
Other OPEC	646	975	806	826	999	1189	1071	1177
Total OPEC	918	1228	969	925	1163	1345	1188	1338
Brazil	231	137	80	464	425	304	459	591
Mexico	767	746	957	931	1038	1269	1613	1633
Other Latin America	1565	1951	1594	1760	2072	2314	2174	2242
Total Latin America	2563	2834	2631	3155	3534	3887	4246	4466
South Korea	465	595	508	615	831	1185	1457	1437
Singapore	279	276	185	179	227	322	472	312
Taiwan	507	472	304	549	807	1180	1402	1179
Other Asian NICS	262	299	324	363	534	794	658	703
Total Asian NICS	1514	1642	1321	1706	2399	3481	3989	3632
Other Developing Countries	905	1153	1082	794	785	1144	1551	1494
Total Developing Countries	5626	6244	5484	6038	7166	9054	10400	10335
China	226	494	350	248	552	1078	862	716
USSR	161	59	122	131	189	161	224	117
Eastern Europe	14	-16	-93	-69	-6	-44	-23	-22
Other CPE	0	0	0	0	0	1	0	0
Total CPE	401	536	379	310	735	1195	1063	812
World	9021	8910	7113	7220	9455	11583	15733	16515

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.6
U.S. EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 51 ORGANIC CHEMICALS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	604	11.3%	667	10.9%	636	10.6%	642	10.0%	741	9.6%	867	8.9%	941	8.9%	1123	10.8%
Japan	653	12.2%	704	11.5%	690	11.5%	743	11.6%	899	11.7%	1120	11.5%	1175	11.1%	1124	10.8%
United Kingdom	248	4.6%	259	4.2%	244	4.1%	251	3.9%	256	3.3%	391	4.0%	372	3.5%	350	3.4%
Germany	138	2.6%	180	2.9%	195	3.2%	206	3.2%	247	3.2%	344	3.5%	379	3.6%	438	4.2%
Netherlands	473	8.8%	491	8.0%	569	9.5%	522	8.1%	762	9.9%	769	7.9%	955	9.0%	825	7.9%
France	84	1.6%	93	1.5%	90	1.5%	82	1.3%	96	1.2%	130	1.3%	131	1.2%	194	1.9%
Italy	109	2.0%	104	1.7%	150	2.5%	153	2.4%	177	2.3%	165	1.7%	175	1.7%	196	1.9%
Other E.C.	43	0.8%	50	0.8%	50	0.8%	56	0.9%	665	8.6%	820	8.4%	1023	9.6%	1036	10.0%
Total E.C.	1476	27.6%	1629	26.7%	1745	29.1%	1773	27.6%	2202	28.5%	2619	27.0%	3036	28.6%	3038	29.2%
Other Developed	496	9.3%	555	9.1%	470	7.8%	420	6.5%	519	6.7%	674	6.9%	833	7.8%	669	6.4%
Total Developed	3229	60.4%	3555	58.2%	3541	59.1%	3578	55.7%	4362	56.5%	5280	54.4%	5984	56.4%	5954	57.3%
Saudi Arabia	9	0.2%	18	0.3%	21	0.3%	26	0.4%	31	0.4%	37	0.4%	30	0.3%	28	0.3%
Other OPEC	187	3.5%	258	4.2%	229	3.8%	236	3.7%	288	3.7%	341	3.5%	251	2.4%	299	2.9%
Total OPEC	196	3.7%	276	4.5%	250	4.2%	262	4.1%	320	4.1%	378	3.9%	281	2.6%	327	3.1%
Brazil	168	3.1%	197	3.2%	197	3.3%	303	4.7%	279	3.6%	257	2.7%	285	2.7%	433	4.2%
Mexico	420	7.9%	544	8.9%	604	10.1%	476	7.4%	523	6.8%	665	6.9%	680	6.4%	598	5.7%
Other Latin America	539	10.1%	655	10.7%	523	8.7%	618	9.6%	673	8.7%	789	8.1%	692	6.5%	719	6.9%
Total Latin America	1127	21.1%	1396	22.8%	1323	22.1%	1396	21.7%	1475	19.1%	1712	17.6%	1657	15.6%	1750	16.8%
South Korea	259	4.8%	325	5.3%	290	4.8%	383	6.0%	472	6.1%	718	7.4%	793	7.5%	692	6.6%
Singapore	64	1.2%	75	1.2%	76	1.3%	97	1.5%	106	1.4%	165	1.7%	198	1.9%	220	2.1%
Taiwan	275	5.1%	248	4.1%	287	4.8%	475	7.4%	669	8.7%	942	9.7%	1051	9.9%	865	8.3%
Other Asian NICS	73	1.4%	67	1.1%	63	1.1%	57	0.9%	101	1.3%	134	1.4%	107	1.0%	108	1.0%
Total Asian NICS	671	12.6%	716	11.7%	717	12.0%	1011	15.7%	1348	17.5%	1960	20.2%	2149	20.3%	1884	18.1%
Other Developing Countries	219	4.1%	255	4.2%	224	3.7%	253	3.9%	281	3.6%	350	3.6%	392	3.7%	406	3.9%
Total Developing Countries	2080	38.9%	2445	40.0%	2352	39.2%	2741	42.7%	3185	41.3%	4121	42.5%	4318	40.7%	4184	40.2%
China	33	0.6%	98	1.6%	89	1.5%	81	1.3%	153	2.0%	280	2.9%	286	2.7%	245	2.4%
USSR	0	0.0%	4	0.1%	2	0.0%	9	0.1%	6	0.1%	10	0.1%	6	0.1%	4	0.0%
Eastern Europe	7	0.1%	9	0.1%	12	0.2%	15	0.2%	11	0.1%	13	0.1%	15	0.1%	12	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	40	0.8%	111	1.8%	103	1.7%	104	1.6%	170	2.2%	303	3.1%	307	2.9%	262	2.5%
World	5349	100.0%	6111	100.0%	5997	100.0%	6423	100.0%	7717	100.0%	9704	100.0%	10609	100.0%	10400	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code. Revision 3

TABLE 3.7
U.S. IMPORTS BY COUNTRY OF ORIGIN (MILLION DOLLARS)
SITC 51 ORGANIC CHEMICALS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	546	15.6%	575	13.2%	585	12.3%	463	9.5%	529	9.6%	803	11.1%	604	8.6%	818	11.1%
Japan	404	11.5%	480	11.1%	524	11.0%	681	13.9%	814	14.8%	859	11.8%	926	13.1%	843	11.4%
United Kingdom	488	13.9%	578	13.3%	572	12.0%	640	13.1%	704	12.8%	914	12.6%	882	12.5%	769	10.4%
Germany	466	13.3%	594	13.7%	585	12.3%	655	13.4%	752	13.7%	1067	14.7%	1070	15.2%	1075	14.5%
Netherlands	288	8.2%	331	7.6%	383	8.0%	279	5.7%	316	5.7%	421	5.8%	361	5.1%	396	5.4%
France	220	6.3%	279	6.4%	309	6.5%	282	5.8%	367	6.7%	438	6.0%	399	5.7%	418	5.7%
Italy	148	4.2%	203	4.7%	287	6.0%	213	4.4%	258	4.7%	320	4.4%	331	4.7%	355	4.8%
Other E.C.	233	6.7%	334	7.7%	331	6.9%	352	7.2%	382	6.9%	530	7.3%	560	7.9%	583	7.9%
Total E.C.	1843	52.6%	2320	53.5%	2467	51.8%	2420	49.6%	2779	50.4%	3690	50.9%	3603	51.2%	3595	48.6%
Other Developed	238	6.8%	281	6.5%	359	7.5%	372	7.6%	455	8.3%	656	9.1%	549	7.8%	577	7.8%
Total Developed	3031	86.5%	3655	84.3%	3935	82.6%	3936	80.6%	4577	83.1%	6008	82.9%	5683	80.7%	5833	78.9%
Saudi Arabia	1	0.0%	1	0.0%	37	0.8%	66	1.4%	50	0.9%	69	1.0%	79	1.1%	75	1.0%
Other OPEC	3	0.1%	4	0.1%	14	0.3%	15	0.3%	16	0.3%	15	0.2%	10	0.1%	17	0.2%
Total OPEC	4	0.1%	5	0.1%	51	1.1%	81	1.7%	65	1.2%	84	1.2%	90	1.3%	92	1.2%
Brazil	178	5.1%	286	6.6%	223	4.7%	169	3.5%	137	2.5%	188	2.6%	134	1.9%	127	1.7%
Mexico	37	1.1%	73	1.7%	51	1.1%	49	1.0%	65	1.2%	127	1.8%	158	2.2%	157	2.1%
Other Latin America	121	3.4%	122	2.8%	207	4.4%	232	4.7%	227	4.1%	319	4.4%	438	6.2%	464	6.3%
Total Latin America	336	9.6%	480	11.1%	481	10.1%	450	9.2%	428	7.8%	634	8.7%	730	10.4%	748	10.1%
South Korea	34	1.0%	39	0.9%	43	0.9%	61	1.2%	67	1.2%	77	1.1%	71	1.0%	73	1.0%
Singapore	4	0.1%	8	0.2%	61	1.3%	113	2.3%	129	2.3%	134	1.9%	157	2.2%	306	4.1%
Taiwan	15	0.4%	21	0.5%	30	0.6%	34	0.7%	34	0.6%	48	0.7%	38	0.5%	42	0.6%
Other Asian NICS	1	0.0%	2	0.0%	2	0.0%	3	0.1%	3	0.1%	8	0.1%	6	0.1%	9	0.1%
Total Asian NICS	54	1.5%	70	1.6%	136	2.9%	212	4.3%	232	4.2%	267	3.7%	272	3.9%	430	5.8%
Other Developing Countries	33	0.9%	53	1.2%	81	1.7%	115	2.4%	122	2.2%	170	2.4%	182	2.6%	201	2.7%
Total Developing Countries	426	12.2%	608	14.0%	745	15.6%	852	17.5%	844	15.3%	1151	15.9%	1269	18.0%	1466	19.8%
China	33	0.9%	42	1.0%	32	0.7%	43	0.9%	43	0.8%	51	0.7%	60	0.9%	71	1.0%
USSR	2	0.1%	12	0.3%	20	0.4%	19	0.4%	17	0.3%	15	0.2%	15	0.2%	10	0.1%
Eastern Europe	10	0.3%	21	0.5%	33	0.7%	33	0.7%	27	0.5%	26	0.4%	15	0.2%	12	0.2%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	45	1.3%	75	1.7%	84	1.8%	95	1.9%	87	1.6%	92	1.3%	91	1.3%	93	1.3%
World	3503	100.0%	4338	100.0%	4765	100.0%	4883	100.0%	5508	100.0%	7250	100.0%	7042	100.0%	7392	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.8
U.S. TRADE BALANCE (MILLION DOLLARS)
SITC 51 ORGANIC CHEMICALS

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990
Canada	58	92	51	178	212	64	337	306
Japan	249	224	166	62	85	261	249	281
United Kingdom	-240	-320	-328	-389	-448	-523	-510	-419
Germany	-328	-415	-390	-449	-506	-723	-691	-637
Netherlands	185	160	186	243	446	348	594	429
France	-136	-186	-220	-199	-271	-308	-268	-224
Italy	-39	-99	-137	-60	-81	-155	-156	-159
Other E.C.	-190	-284	-281	-296	284	290	464	453
Total E.C.	-367	-691	-721	-647	-576	-1071	-568	-557
Other Developed	258	275	111	48	64	18	283	92
Total Developed	197	-100	-394	-358	-215	-728	301	121
Saudi Arabia	8	17	-16	-40	-18	-32	-50	-47
Other OPEC	184	254	215	221	272	326	241	282
Total OPEC	192	271	199	181	254	294	191	235
Brazil	-10	-89	-26	134	143	70	151	306
Mexico	383	471	553	426	458	538	522	441
Other Latin America	418	533	315	386	446	471	254	255
Total Latin America	791	916	842	946	1047	1078	927	1002
South Korea	225	286	247	323	405	641	722	618
Singapore	61	67	16	-17	-23	31	42	-86
Taiwan	259	227	257	441	635	895	1012	822
Other Asian NICS	73	65	61	53	98	126	101	99
Total Asian NICS	618	646	580	800	1115	1693	1877	1453
Other Developing Countries	186	202	144	138	159	180	209	205
Total Developing Countries	1653	1837	1606	1889	2341	2970	3050	2718
China	1	56	58	38	110	229	226	174
USSR	-2	-8	-18	-10	-12	-5	-9	-6
Eastern Europe	-4	-12	-21	-19	-16	-13	0	0
Other CPE	0	0	0	0	0	0	0	0
Total CPE	-5	36	19	9	83	212	216	169
World	1846	1773	1232	1539	2209	2454	3567	3008

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.9
U.S. EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 52 INORGANIC CHEMICALS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	297	10.0%	312	8.9%	329	9.1%	345	9.4%	387	10.2%	484	11.3%	483	11.2%	460	12.0%
Japan	632	21.3%	834	23.8%	820	22.6%	909	24.7%	872	23.0%	936	21.8%	1130	26.2%	963	25.2%
United Kingdom	84	2.8%	114	3.2%	71	2.0%	89	2.4%	168	4.4%	149	3.5%	203	4.7%	126	3.3%
Germany	370	12.5%	417	11.9%	344	9.5%	341	9.2%	270	7.1%	244	5.7%	257	6.0%	241	6.3%
Netherlands	63	2.1%	95	2.7%	162	4.5%	153	4.2%	163	4.3%	168	3.9%	177	4.1%	172	4.5%
France	31	1.0%	138	3.9%	207	5.7%	243	6.6%	159	4.2%	129	3.0%	95	2.2%	56	1.5%
Italy	16	0.5%	18	0.5%	29	0.8%	38	1.0%	54	1.4%	50	1.2%	43	1.0%	52	1.4%
Other E.C.	89	3.0%	202	5.8%	217	6.0%	131	3.5%	175	4.6%	167	3.9%	164	3.8%	109	2.9%
Total E.C.	653	22.0%	984	28.1%	1030	28.4%	995	27.0%	989	26.1%	906	21.1%	939	21.7%	757	19.8%
Other Developed	395	13.3%	283	8.1%	356	9.8%	246	6.7%	222	5.9%	309	7.2%	305	7.1%	305	8.0%
Total Developed	1977	66.7%	2412	68.8%	2534	69.9%	2496	67.8%	2470	65.2%	2636	61.4%	2857	66.2%	2485	65.1%
Saudi Arabia	15	0.5%	17	0.5%	9	0.3%	8	0.2%	10	0.3%	16	0.4%	7	0.2%	5	0.1%
Other OPEC	100	3.4%	136	3.9%	101	2.8%	101	2.7%	139	3.7%	181	4.2%	151	3.5%	174	4.6%
Total OPEC	115	3.9%	154	4.4%	110	3.0%	109	3.0%	148	3.9%	196	4.6%	158	3.7%	179	4.7%
Brazil	54	1.8%	74	2.1%	72	2.0%	114	3.1%	109	2.9%	100	2.3%	109	2.5%	76	2.0%
Mexico	114	3.8%	115	3.3%	136	3.8%	127	3.4%	168	4.4%	182	4.2%	205	4.8%	223	5.8%
Other Latin America	208	7.0%	249	7.1%	237	6.5%	262	7.1%	316	8.3%	436	10.2%	372	8.6%	393	10.3%
Total Latin America	376	12.7%	439	12.5%	446	12.3%	502	13.6%	593	15.7%	718	16.7%	686	15.9%	691	18.1%
South Korea	58	2.0%	83	2.4%	79	2.2%	83	2.2%	123	3.3%	171	4.0%	195	4.5%	194	5.1%
Singapore	11	0.4%	10	0.3%	9	0.3	12	0.3%	15	0.4%	18	0.4%	25	0.6%	21	0.6%
Taiwan	157	5.3%	124	3.5%	64	1.8%	97	2.6%	59	1.6%	80	1.9%	166	3.9%	129	3.4%
Other Asian NICS	13	0.5%	30	0.9%	64	1.8%	61	1.7%	52	1.4%	35	0.8%	55	1.3%	29	0.8%
Total Asian NICS	240	8.1%	246	7.0%	217	6.0%	253	6.9%	250	6.6%	304	7.1%	442	10.2%	375	9.8%
Other Developing Countries	119	4.0%	181	5.2%	234	6.5%	215	5.8%	172	4.5%	280	6.5%	172	4.0%	164	4.3%
Total Developing Countries	788	26.6%	925	26.4%	926	25.5%	1011	27.4%	1061	28.0%	1371	32.0%	1357	31.4%	1294	33.9%
China	20	0.7%	19	0.5%	18	0.5%	66	1.8%	155	4.1%	188	4.4%	82	1.9%	20	0.5%
USSR	169	5.7%	143	4.1%	132	3.6%	86	2.3%	87	2.3%	80	1.9%	15	0.4%	5	0.1%
Eastern Europe	12	0.4%	7	0.2%	15	0.4%	25	0.7%	17	0.5%	15	0.3%	7	0.2%	12	0.3%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	201	6.8%	169	4.8%	165	4.6%	177	4.8%	259	6.8%	282	6.6%	105	2.4%	37	1.0%
World	2966	100.0%	3506	100.0%	3625	100.0%	3683	100.0%	3789	100.0%	4289	100.0%	4319	100.0%	3816	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.10
U.S. IMPORTS BY COUNTRY OF ORIGIN (MILLION DOLLARS)
SITC 52 INORGANIC CHEMICALS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	686	29.8%	1124	36.1%	968	31.9%	978	33.4%	1065	39.9%	1117	35.5%	1251	38.7%	1061	32.8%
Japan	106	4.6%	107	3.4%	110	3.6%	110	3.8%	157	5.9%	151	4.8%	164	5.1%	158	4.9%
United Kingdom	174	7.5%	203	6.5%	127	4.2%	276	9.4%	113	4.2%	314	10.0%	223	6.9%	244	7.5%
Germany	176	7.7%	271	8.7%	169	5.6%	256	8.7%	243	9.1%	259	8.2%	326	10.1%	422	13.1%
Netherlands	32	1.4%	20	0.6%	66	2.2%	32	1.1%	33	1.2%	44	1.4%	53	1.6%	60	1.9%
France	298	12.9%	416	13.4%	636	21.0%	378	12.9%	418	15.7%	376	11.9%	254	7.9%	187	5.8%
Italy	13	0.6%	16	0.5%	43	1.4%	40	1.4%	40	1.5%	46	1.5%	40	1.2%	47	1.5%
Other E.C.	42	1.8%	54	1.7%	86	2.9%	55	1.9%	50	1.9%	72	2.3%	68	2.1%	60	1.9%
Total E.C.	734	31.9%	980	31.5%	1127	37.2%	1039	35.5%	897	33.6%	1111	35.3%	964	29.8%	1021	31.6%
Other Developed	352	15.3%	324	10.4%	357	11.8%	420	14.3%	167	6.2%	235	7.5%	190	5.9%	239	7.4%
Total Developed	1879	81.6%	2535	81.5%	2561	84.6%	2547	86.9%	2286	85.7%	2613	83.0%	2569	79.5%	2479	76.7%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2	0.1%	7	0.2%	11	0.3%	4	0.1%
Other OPEC	7	0.3%	16	0.5%	11	0.4%	4	0.1%	2	0.1%	4	0.1%	16	0.5%	7	0.2%
Total OPEC	7	0.3%	16	0.5%	11	0.4%	4	0.1%	4	0.2%	10	0.3%	27	0.8%	11	0.3%
Brazil	11	0.5%	26	0.8%	27	0.9%	24	0.8%	19	0.7%	30	1.0%	59	1.8%	61	1.9%
Mexico	166	7.2%	173	5.5%	134	4.4%	124	4.2%	137	5.1%	193	6.1%	204	6.3%	236	7.3%
Other Latin America	98	4.3%	161	5.2%	98	3.2%	67	2.3%	74	2.8%	115	3.6%	162	5.0%	134	4.1%
Total Latin America	275	11.9%	360	11.6%	259	8.6%	215	7.3%	230	8.6%	338	10.7%	425	13.2%	431	13.3%
South Korea	5	0.2%	6	0.2%	3	0.1%	3	0.1%	3	0.1%	5	0.2%	6	0.2%	6	0.2%
Singapore	0	0.0%	0	0.0%	0	0.0%	1	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.0%
Taiwan	5	0.2%	6	0.2%	6	0.2%	8	0.3%	8	0.3%	10	0.3%	10	0.3%	10	0.3%
Other Asian NICS	0	0.0%	1	0.0%	3	0.1%	3	0.1%	3	0.1%	5	0.1%	7	0.2%	6	0.2%
Total Asian NICS	10	0.4%	14	0.5%	12	0.4%	15	0.5%	14	0.5%	20	0.6%	23	0.7%	20	0.6%
Other Developing Countries	19	0.8%	22	0.7%	30	1.0%	31	1.0%	27	1.0%	30	0.9%	47	1.4%	41	1.3%
Total Developing Countries	305	13.2%	399	12.8%	306	10.1%	261	8.9%	273	10.2%	394	12.5%	517	16.0%	498	15.4%
China	15	0.6%	31	1.0%	38	1.3%	33	1.1%	39	1.5%	53	1.7%	57	1.8%	99	3.1%
USSR	98	4.3%	142	4.6%	119	3.9%	84	2.9%	64	2.4%	77	2.4%	83	2.6%	151	4.7%
Eastern Europe	5	0.2%	4	0.1%	4	0.1%	5	0.2%	6	0.2%	10	0.3%	4	0.1%	6	0.2%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	118	5.1%	177	5.7%	161	5.3%	122	4.2%	109	4.1%	140	4.4%	145	4.5%	256	7.9%
World	2301	100.0%	3111	100.0%	3029	100.0%	2930	100.0%	2668	100.0%	3147	100.0%	3231	100.0%	3234	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.11
TRADE BALANCE (MILLION DOLLARS)
SITC 52 INORGANIC CHEMICALS

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990
Canada	-389	-812	-639	-633	-678	-633	-768	-602
Japan	526	727	709	799	714	786	966	805
United Kingdom	-89	-90	-56	-187	55	-165	-19	-117
Germany	194	146	175	84	27	-15	-69	-181
Netherlands	31	75	96	121	131	125	124	112
France	-267	-277	-429	-136	-259	-247	-159	-131
Italy	3	2	-14	-2	14	4	3	4
Other E.C.	47	147	131	75	125	94	96	48
Total E.C.	-81	3	-97	-44	92	-205	-25	-264
Other Developed	42	-41	-1	-173	56	75	115	67
Total Developed	98	-123	-27	-51	184	22	288	6
Saudi Arabia	15	17	9	8	8	9	-4	1
Other OPEC	94	120	90	98	136	177	135	168
Total OPEC	108	137	99	106	144	186	131	168
Brazil	44	48	45	90	90	70	50	14
Mexico	-52	-57	2	2	31	-11	1	-13
Other Latin America	110	88	139	195	242	322	210	259
Total Latin America	102	79	186	287	363	380	261	260
South Korea	53	77	76	80	121	166	189	188
Singapore	11	9	9	11	15	18	25	20
Taiwan	152	118	58	89	51	70	156	119
Other Asian NICS	13	29	61	58	49	31	48	24
Total Asian NICS	230	232	205	238	236	285	419	354
Other Developing Countries	100	159	204	184	145	251	125	123
Total Developing Countries	483	526	620	750	787	977	840	796
China	5	-11	-20	33	116	134	25	-79
USSR	71	1	13	2	23	3	-68	-147
Eastern Europe	7	3	11	19	11	5	3	6
Other CPE	0	0	0	0	0	0	0	0
Total CPE	83	-8	4	55	150	143	-40	-219
World	665	395	596	753	1121	1142	1088	582

Source: U.S. Department of Commerce
Standard International Trade Code. Revision 3

TABLE 3.12
EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 53 DYEING, TANNING AND COLORING MATERIALS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	164	22.9%	179	24.5%	172	25.1%	156	20.4%	223	23.4%	227	20.6%	230	20.9%	421	26.5%
Japan	51	7.1%	56	7.6%	62	9.0%	68	8.9%	76	8.0%	95	8.6%	93	8.5%	116	7.3%
United Kingdom	40	5.6%	35	4.8%	29	4.3%	34	4.4%	43	4.5%	58	5.2%	70	6.3%	104	6.5%
Germany	26	3.6%	27	3.7%	27	4.0%	29	3.8%	44	4.6%	44	4.0%	37	3.4%	54	3.4%
Netherlands	35	5.0%	37	5.0%	35	5.1%	45	5.8%	47	5.0%	60	5.4%	44	4.0%	59	3.7%
France	16	2.2%	13	1.8%	12	1.8%	19	2.5%	24	2.5%	23	2.1%	16	1.5%	19	1.2%
Italy	11	1.5%	10	1.3%	8	1.2%	9	1.2%	13	1.4%	14	1.2%	13	1.2%	16	1.0%
Other E.C.	41	5.7%	34	4.7%	31	4.5%	47	6.2%	53	5.6%	80	7.3%	81	7.4%	151	9.5%
Total E.C.	168	23.5%	155	21.3%	143	20.8%	183	23.9%	224	23.6%	278	25.3%	261	23.8%	402	25.3%
Other Developed	48	6.7%	51	7.0%	47	6.9%	55	7.2%	56	5.9%	70	6.3%	73	6.7%	87	5.5%
Total Developed	431	60.3%	441	60.3%	424	61.9%	463	60.3%	580	60.9%	670	60.8%	657	59.9%	1026	64.6%
Saudi Arabia	30	4.2%	19	2.6%	12	1.7%	11	1.5%	13	1.4%	14	1.2%	14	1.3%	12	0.8%
Other OPEC	29	4.0%	38	5.2%	31	4.5%	31	4.1%	40	4.2%	50	4.5%	37	3.4%	31	1.9%
Total OPEC	58	8.2%	58	7.9%	43	6.3%	42	5.5%	54	5.6%	63	5.7%	51	4.7%	43	2.7%
Brazil	12	1.7%	10	1.4%	8	1.2%	14	1.8%	13	1.3%	14	1.3%	20	1.9%	22	1.4%
Mexico	38	5.3%	45	6.1%	46	6.7%	48	6.3%	58	6.1%	67	6.1%	69	6.2%	98	6.2%
Other Latin America	81	11.3%	86	11.8%	77	11.2%	86	11.1%	106	11.2%	115	10.4%	101	9.2%	113	7.1%
Total Latin America	131	18.3%	141	19.3%	131	19.1%	148	19.2%	177	18.6%	196	17.8%	190	17.3%	233	14.7%
South Korea	18	2.5%	18	2.5%	18	2.6%	27	3.6%	43	4.5%	48	4.4%	52	4.8%	87	5.5%
Singapore	14	2.0%	13	1.8%	10	1.5%	13	1.7%	16	1.7%	19	1.7%	23	2.1%	41	2.6%
Taiwan	21	2.9%	21	2.9%	19	2.8%	27	3.6%	35	3.7%	42	3.8%	34	3.1%	37	2.3%
Other Asian NICS	12	1.6%	16	2.2%	16	2.3%	21	2.8%	26	2.8%	32	2.9%	35	3.2%	38	2.4%
Total Asian NICS	64	9.0%	68	9.3%	63	9.2%	89	11.6%	121	12.7%	141	12.8%	144	13.2%	203	12.8%
Other Developing Countries	38	5.3%	38	5.2%	32	4.7%	34	4.5%	39	4.1%	49	4.4%	54	4.9%	72	4.5%
Total Developing Countries	277	38.7%	283	38.7%	250	36.6%	294	38.4%	361	37.9%	416	37.8%	424	38.6%	535	33.7%
China	1	0.1%	2	0.3%	5	0.7%	5	0.6%	5	0.6%	10	1.0%	14	1.3%	22	1.4%
USSR	4	0.6%	3	0.5%	4	0.6%	4	0.5%	5	0.5%	3	0.3%	1	0.1%	4	0.3%
Eastern Europe	2	0.3%	1	0.2%	2	0.3%	2	0.3%	1	0.1%	2	0.2%	1	0.1%	1	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	7	1.0%	7	1.0%	11	1.6%	10	1.3%	11	1.2%	15	1.4%	16	1.5%	27	1.7%
World	715	100.0%	731	100.0%	685	100.0%	767	100.0%	952	100.0%	1100	100.0%	1097	100.0%	1588	100.0%

Source: U.S. Department of Commerce
Standard International Code, Revision 3

TABLE 3.13
IMPORTS BY COUNTRY OF ORIGIN (MILLION DOLLARS)
SITC 53 DYEING, TANNING AND COLORING MATERIALS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	51	7.9%	62	7.7%	63	7.4%	69	6.4%	80	6.3%	103	7.9%	112	9.9%	156	12.1%
Japan	122	19.0%	178	22.2%	195	22.8%	272	25.5%	340	26.9%	260	20.0%	154	13.6%	169	13.2%
United Kingdom	60	9.4%	72	9.0%	73	8.5%	91	8.5%	112	8.8%	138	10.6%	109	9.6%	132	10.3%
Germany	164	25.5%	195	24.3%	202	23.6%	268	25.1%	331	26.1%	330	25.4%	316	27.9%	359	27.8%
Netherlands	17	2.6%	22	2.7%	23	2.7%	34	3.2%	35	2.8%	39	3.0%	32	2.8%	32	2.5%
France	54	8.3%	74	9.2%	68	8.0%	74	6.9%	70	5.5%	75	5.7%	62	5.5%	59	4.6%
Italy	7	1.1%	11	1.4%	15	1.7%	18	1.7%	18	1.5%	30	2.3%	26	2.3%	19	1.5%
Other E.C.	49	7.7%	52	6.5%	61	7.2%	68	6.4%	74	5.8%	71	5.4%	70	6.2%	55	4.3%
Total E.C.	351	54.6%	426	53.1%	442	51.7%	553	51.8%	640	50.5%	683	52.5%	615	54.3%	657	51.0%
Other Developed	68	10.5%	72	9.0%	74	8.6%	111	10.4%	125	9.8%	126	9.6%	119	10.5%	131	10.2%
Total Developed	592	92.0%	738	91.9%	774	90.5%	1006	94.1%	1185	93.5%	1172	90.0%	1001	88.3%	1114	86.4%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other OPEC	15	2.3%	1	0.1%	1	0.2%	2	0.2%	2	0.2%	3	0.2%	1	0.1%	4	0.3%
Total OPEC	15	2.3%	1	0.1%	1	0.2%	2	0.2%	2	0.2%	3	0.2%	1	0.1%	4	0.3%
Brazil	6	0.9%	9	1.1%	9	1.1%	6	0.6%	6	0.5%	7	0.6%	3	0.2%	3	0.2%
Mexico	6	0.9%	25	3.2%	31	3.6%	13	1.3%	20	1.5%	41	3.2%	33	2.9%	39	3.0%
Other Latin America	25	3.9%	10	1.3%	10	1.2%	11	1.0%	12	1.0%	15	1.1%	19	1.7%	17	1.3%
Total Latin America	36	5.6%	44	5.5%	50	5.9%	31	2.9%	38	3.0%	63	4.9%	55	4.9%	59	4.6%
Korea, South	2	0.4%	3	0.4%	5	0.5%	5	0.5%	6	0.5%	8	0.6%	9	0.8%	20	1.5%
Singapore	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.0%	1	0.1%	3	0.3%	6	0.5%
Taiwan	3	0.5%	5	0.7%	3	0.4%	6	0.5%	8	0.6%	11	0.8%	15	1.3%	22	1.7%
Other Asian NICS	1	0.1%	1	0.1%	1	0.1%	1	0.1%	2	0.2%	2	0.2%	3	0.3%	3	0.3%
Total Asian NICS	6	1.0%	10	1.3%	9	1.0%	12	1.1%	16	1.3%	22	1.7%	31	2.7%	51	4.0%
Other Developing Countries	5	0.7%	7	0.9%	8	0.9%	9	0.9%	17	1.4%	23	1.8%	28	2.4%	37	2.9%
Total Developing Countries	48	7.4%	61	7.6%	68	7.9%	53	4.9%	72	5.7%	109	8.3%	114	10.0%	148	11.5%
China	3	0.4%	2	0.3%	4	0.5%	6	0.5%	8	0.6%	13	1.0%	14	1.3%	22	1.7%
USSR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Eastern Europe	1	0.2%	2	0.2%	9	1.1%	5	0.5%	2	0.2%	8	0.6%	4	0.4%	4	0.3%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	4	0.6%	4	0.5%	13	1.5%	11	1.0%	10	0.8%	21	1.6%	19	1.7%	26	2.0%
World	644	100.0%	803	100.0%	855	100.0%	1069	100.0%	1267	100.0%	1302	100.0%	1133	100.0%	1288	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.14
TRADE BALANCE (MILLION DOLLARS)
SITC 53 DYEING, TANNING AND COLORING MATERIALS

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990
Canada	113	117	109	87	143	124	118	265
Japan	-71	-123	-133	-204	-264	-166	-61	-54
United Kingdom	-20	-37	-43	-57	-69	-80	-40	-29
Germany	-138	-168	-174	-239	-287	-286	-279	-305
Netherlands	19	15	11	10	13	20	12	27
France	-38	-61	-56	-55	-47	-52	-46	-40
Italy	4	-1	-6	-9	-5	-17	-13	-3
Other E.C.	-8	-17	-31	-21	-21	9	11	96
Total E.C.	-183	-271	-300	-370	-416	-405	-354	-255
Other Developed	-20	-21	-26	-56	-68	-56	-46	-44
Total Developed	-161	-297	-350	-544	-605	-503	-344	-88
Saudi Arabia	30	19	12	11	13	14	14	12
Other OPEC	14	38	30	29	38	46	36	27
Total OPEC	44	57	42	40	52	60	50	39
Brazil	7	1	-1	7	6	7	18	19
Mexico	32	19	15	35	38	26	35	59
Other Latin America	56	76	66	74	94	100	82	96
Total Latin America	94	97	81	117	139	133	135	174
South Korea	16	15	13	22	37	40	43	67
Singapore	14	13	10	13	16	18	20	34
Taiwan	17	16	16	22	27	31	19	15
Other Asian NICS	11	15	15	20	24	30	32	35
Total Asian NICS	58	58	54	77	105	119	114	151
Other Developing Countries	33	31	24	25	22	26	27	35
Total Developing Countries	229	222	183	241	289	307	310	387
China	-2	0	1	-1	-2	-3	0	0
USSR	4	3	4	4	5	3	1	4
Eastern Europe	1	0	-7	-3	-1	-6	-4	-3
Other CPE	0	0	0	0	0	0	0	0
Total CPE	3	3	-3	0	2	-6	-3	1
World	71	-72	-170	-303	-314	-202	-37	300

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.15
EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 54 MEDICINAL AND PHARMACEUTICAL PRODUCTS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	174	7.8%	174	7.5%	181	7.5%	185	7.0%	212	7.8%	255	7.8%	266	7.3%	450	11.0%
Japan	504	22.7%	524	22.6%	549	22.7%	576	21.7%	613	22.6%	725	22.2%	785	21.5%	764	18.6%
United Kingdom	128	5.8%	140	6.1%	136	5.6%	157	5.9%	154	5.7%	185	5.7%	193	5.3%	216	5.3%
Germany	132	6.0%	174	7.5%	192	7.9%	247	9.3%	264	9.7%	290	8.9%	330	9.0%	319	7.8%
Netherlands	51	2.3%	58	2.5%	62	2.6%	64	2.4%	69	2.5%	80	2.4%	142	3.9%	191	4.6%
France	166	7.5%	160	6.9%	143	5.9%	154	5.8%	156	5.7%	204	6.2%	231	6.3%	270	6.6%
Italy	109	4.9%	108	4.7%	122	5.1%	146	5.5%	155	5.7%	223	6.8%	257	7.0%	276	6.7%
Other E.C.	102	4.6%	227	9.8%	260	10.8%	305	11.5%	242	8.9%	339	10.4%	420	11.5%	451	11.0%
Total E.C.	816	36.8%	867	37.4%	916	37.9%	1073	40.3%	1039	38.2%	1320	40.5%	1573	43.0%	1723	42.0%
Other Developed	236	10.7%	224	9.7%	239	9.9%	283	10.6%	288	10.6%	314	9.6%	344	9.4%	377	9.2%
Total Developed	1730	78.0%	1789	77.3%	1885	78.0%	2118	79.6%	2153	79.2%	2614	80.1%	2968	81.1%	3314	80.8%
Saudi Arabia	43	2.0%	51	2.2%	48	2.0%	41	1.5%	50	1.8%	54	1.7%	44	1.2%	44	1.1%
Other OPEC	75	3.4%	71	3.1%	72	3.0%	72	2.7%	71	2.6%	79	2.4%	51	1.4%	50	1.2%
Total OPEC	119	5.3%	122	5.3%	119	4.9%	113	4.2%	120	4.4%	133	4.1%	96	2.6%	93	2.3%
Brazil	32	1.4%	22	1.0%	22	0.9%	38	1.4%	36	1.3%	32	1.0%	52	1.4%	54	1.3%
Mexico	30	1.3%	38	1.6%	46	1.9%	47	1.8%	48	1.8%	57	1.7%	73	2.0%	105	2.6%
Other Latin America	187	8.5%	195	8.4%	196	8.1%	208	7.8%	202	7.4%	210	6.4%	185	5.1%	197	4.8%
Total Latin America	249	11.2%	255	11.0%	264	10.9%	293	11.0%	286	10.5%	299	9.2%	310	8.5%	357	8.7%
South Korea	22	1.0%	22	1.0%	26	1.1%	24	0.9%	29	1.1%	41	1.2%	43	1.2%	53	1.3%
Singapore	7	0.3%	6	0.3%	6	0.3%	8	0.3%	10	0.4%	12	0.4%	16	0.4%	13	0.3%
Taiwan	19	0.9%	25	1.1%	26	1.1%	32	1.2%	33	1.2%	45	1.4%	42	1.2%	50	1.2%
Other Asian NICS	21	1.0%	26	1.1%	26	1.1%	26	1.0%	33	1.2%	39	1.2%	39	1.1%	56	1.4%
Total Asian NICS	69	3.1%	78	3.4%	84	3.5%	90	3.4%	105	3.8%	137	4.2%	140	3.8%	171	4.2%
Other Developing Countries	79	3.6%	105	4.5%	105	4.4%	89	3.3%	87	3.2%	124	3.8%	143	3.9%	152	3.7%
Total Developing Countries	480	21.6%	517	22.3%	521	21.6%	533	20.0%	541	19.9%	634	19.4%	663	18.1%	743	18.1%
China	1	0.1%	1	0.1%	2	0.1%	3	0.1%	18	0.6%	6	0.2%	8	0.2%	14	0.3%
USSR	1	0.0%	1	0.1%	1	0.0%	1	0.0%	1	0.0%	2	0.1%	13	0.3%	25	0.6%
Eastern Europe	5	0.2%	6	0.3%	8	0.3%	7	0.2%	6	0.2%	5	0.2%	8	0.2%	6	0.2%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	8	0.3%	9	0.4%	11	0.5%	11	0.4%	24	0.9%	14	0.4%	29	0.8%	46	1.1%
World	2217	100.0%	2316	100.0%	2418	100.0%	2662	100.0%	2718	100.0%	3262	100.0%	3660	100.0%	4103	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code

TABLE 3.16
IMPORTS BY COUNTRY OF ORIGIN (MILLION DOLLARS)
SITC 54 MEDICINAL AND PHARMACEUTICAL PRODUCTS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	16	1.9%	21	2.0%	26	2.3%	24	1.9%	32	2.1%	45	2.4%	72	3.4%	101	4.0%
Japan	112	13.8%	104	10.0%	115	10.2%	163	13.2%	174	11.6%	195	10.5%	213	10.2%	213	8.5%
United Kingdom	134	16.5%	232	22.4%	201	17.8%	207	16.8%	238	15.8%	349	18.9%	367	17.6%	457	18.3%
Germany	132	16.3%	136	13.2%	151	13.4%	190	15.4%	270	17.9%	293	15.8%	304	14.6%	337	13.5%
Netherlands	25	3.0%	27	2.6%	39	3.5%	37	3.0%	33	2.2%	28	1.5%	39	1.9%	37	1.5%
France	50	6.2%	50	4.8%	52	4.6%	65	5.3%	74	4.9%	78	4.2%	88	4.2%	113	4.5%
Italy	84	10.4%	110	10.6%	127	11.2%	108	8.8%	173	11.5%	188	10.1%	157	7.5%	183	7.3%
Other E.C.	72	8.8%	132	12.7%	88	7.8%	84	6.9%	134	8.9%	191	10.3%	268	12.9%	334	13.3%
Total E.C.	497	61.2%	687	66.3%	658	58.3%	691	56.1%	922	61.1%	1127	61.0%	1223	58.6%	1461	58.4%
Other Developed	109	13.5%	140	13.6%	244	21.6%	254	20.6%	275	18.2%	352	19.0%	460	22.1%	581	23.2%
Total Developed	734	90.4%	952	91.9%	1043	92.4%	1132	91.9%	1403	93.0%	1719	93.0%	1968	94.4%	2356	94.2%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other OPEC	1	0.2%	3	0.2%	3	0.2%	3	0.2%	3	0.2%	2	0.1%	3	0.1%	3	0.1%
Total OPEC	1	0.2%	3	0.2%	3	0.2%	3	0.2%	3	0.2%	2	0.1%	3	0.1%	3	0.1%
Brazil	8	0.9%	5	0.5%	7	0.6%	6	0.5%	8	0.5%	9	0.5%	6	0.3%	8	0.3%
Mexico	12	1.5%	12	1.2%	12	1.0%	19	1.5%	23	1.5%	22	1.2%	17	0.8%	15	0.6%
Other Latin America	24	2.9%	26	2.5%	22	2.0%	26	2.1%	23	1.5%	30	1.6%	11	0.5%	15	0.6%
Total Latin America	44	5.4%	44	4.3%	41	3.6%	51	4.1%	53	3.5%	62	3.3%	33	1.6%	37	1.5%
South Korea	2	0.2%	2	0.2%	3	0.3%	3	0.2%	3	0.2%	2	0.1%	2	0.1%	3	0.1%
Singapore	0	0.0%	5	0.4%	1	0.1%	1	0.1%	3	0.2%	9	0.5%	3	0.1%	9	0.3%
Taiwan	0	0.1%	2	0.1%	2	0.1%	1	0.1%	2	0.1%	2	0.1%	3	0.1%	4	0.2%
Other Asian NICS	0	0.0%	1	0.1%	1	0.1%	2	0.2%	2	0.1%	2	0.1%	2	0.1%	8	0.3%
Total Asian NICS	3	0.3%	10	0.9%	6	0.5%	7	0.6%	10	0.6%	16	0.9%	9	0.4%	24	1.0%
Other Developing Countries	4	0.5%	5	0.5%	9	0.8%	8	0.7%	9	0.6%	18	1.0%	13	0.6%	21	0.8%
Total Developing Countries	52	6.4%	61	5.9%	58	5.2%	69	5.6%	74	4.9%	97	5.3%	57	2.7%	84	3.4%
China	21	2.6%	17	1.7%	21	1.9%	21	1.7%	25	1.6%	26	1.4%	50	2.4%	47	1.9%
USSR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Eastern Europe	5	0.6%	5	0.5%	7	0.6%	9	0.7%	7	0.5%	7	0.4%	10	0.5%	13	0.5%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	26	3.2%	22	2.2%	28	2.5%	30	2.5%	32	2.1%	33	1.8%	60	2.9%	60	2.4%
World	812	100.0%	1036	100.0%	1129	100.0%	1231	100.0%	1509	100.0%	1849	100.0%	2086	100.0%	2500	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.17
TRADE BALANCE (MILLION DOLLARS)
SITC 54 MEDICINAL AND PHARMACEUTICAL PRODUCTS

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990
Canada	158	153	155	162	181	210	194	349
Japan	392	420	434	413	439	530	572	551
United Kingdom	-6	-92	-65	-50	-84	-164	-174	-241
Germany	0	37	40	57	-6	-3	26	-18
Netherlands	27	31	23	27	36	52	103	154
France	116	109	92	89	82	125	142	156
Italy	24	-1	-5	38	-17	35	100	93
Other E.C.	31	96	172	221	107	148	152	117
Total E.C.	319	180	257	382	117	193	350	263
Other Developed	127	84	-4	30	13	-38	-116	-204
Total Developed	996	838	842	987	749	895	999	958
Saudi Arabia	43	51	48	41	50	54	44	44
Other OPEC	74	68	69	69	68	77	49	47
Total OPEC	117	120	117	110	117	131	93	91
Brazil	25	17	14	32	28	23	46	47
Mexico	18	25	35	28	25	35	57	90
Other Latin America	163	169	173	182	180	180	174	183
Total Latin America	206	211	223	242	233	237	277	320
South Korea	20	20	23	21	26	38	41	49
Singapore	6	1	6	7	6	3	14	4
Taiwan	19	23	24	31	31	43	39	46
Other Asian NICS	21	25	25	23	31	37	37	48
Total Asian NICS	66	69	78	83	95	121	131	147
Other Developing Countries	75	100	97	81	79	107	130	131
Total Developing Countries	428	456	463	464	467	537	606	659
China	-19	-16	-19	-18	-7	-19	-42	-33
USSR	1	1	1	1	1	2	13	25
Eastern Europe	0	1	2	-2	-1	-2	-3	-7
Other CPE	0	0	0	0	0	0	0	0
Total CPE	-18	-13	-16	-20	-8	-19	-32	-15
World	1405	1280	1288	1431	1209	1413	1574	1603

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.18
EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 55 ESSENTIAL OILS AND PERFUME MATERIALS; TOILET, POLISHING AND CLEANSING PREPARATIONS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	118	14.8%	116	14.3%	103	13.3%	105	13.0%	140	14.7%	165	14.6%	215	14.7%	401	20.5%
Japan	58	7.2%	74	9.2%	71	9.2%	78	9.7%	125	13.1%	111	9.9%	163	11.1%	249	12.7%
United Kingdom	58	7.3%	60	7.4%	66	8.6%	65	8.0%	73	7.6%	101	9.0%	123	8.4%	127	6.5%
Germany	34	4.3%	25	3.0%	24	3.1%	25	3.1%	30	3.2%	40	3.5%	45	3.1%	71	3.6%
Netherlands	24	3.1%	24	3.0%	24	3.1%	29	3.6%	34	3.5%	43	3.8%	43	2.9%	49	2.5%
France	23	2.8%	25	3.1%	30	3.9%	24	2.9%	29	3.1%	41	3.7%	48	3.3%	59	3.0%
Italy	8	1.0%	7	0.8%	8	1.0%	9	1.1%	10	1.0%	17	1.5%	23	1.6%	26	1.3%
Other E.C.	36	4.5%	30	3.6%	34	4.4%	32	4.0%	34	3.6%	43	3.9%	59	4.0%	78	4.0%
Total E.C.	183	23.0%	171	21.0%	186	24.1%	185	22.8%	210	22.0%	286	25.4%	341	23.2%	410	20.9%
Other Developed	65	8.2%	71	8.7%	67	8.6%	74	9.2%	80	8.4%	89	7.9%	116	7.9%	128	6.5%
Total Developed	423	53.2%	432	53.2%	426	55.2%	442	54.7%	553	58.1%	651	57.8%	835	56.9%	1189	60.6%
																0.0%
Saudi Arabia	39	4.9%	31	3.8%	28	3.7%	20	2.5%	24	2.6%	21	1.9%	23	1.6%	33	1.7%
Other OPEC	54	6.8%	55	6.8%	48	6.3%	42	5.2%	53	5.6%	66	5.9%	64	4.3%	76	3.9%
Total OPEC	93	11.7%	86	10.6%	77	9.9%	62	7.7%	77	8.1%	87	7.7%	87	5.9%	109	5.6%
Brazil	10	1.2%	7	0.8%	7	0.9%	9	1.2%	9	0.9%	10	0.9%	16	1.1%	16	0.8%
Mexico	18	2.2%	21	2.6%	25	3.2%	26	3.2%	26	2.7%	35	3.1%	83	5.6%	125	6.4%
Other Latin America	162	20.4%	165	20.3%	143	18.5%	153	18.9%	166	17.5%	184	16.4%	222	15.1%	237	12.1%
Total Latin America	190	23.8%	193	23.7%	175	22.7%	189	23.3%	201	21.1%	230	20.4%	320	21.8%	377	19.2%
South Korea	11	1.4%	14	1.7%	12	1.5%	16	1.9%	19	2.0%	29	2.5%	40	2.7%	51	2.6%
Singapore	13	1.7%	15	1.8%	13	1.7%	15	1.8%	16	1.7%	20	1.7%	31	2.1%	33	1.7%
Taiwan	11	1.3%	16	2.0%	12	1.6%	21	2.5%	19	2.0%	26	2.3%	36	2.4%	53	2.7%
Other Asian NICS	28	3.6%	33	4.1%	32	4.1%	35	4.3%	38	4.0%	43	3.8%	50	3.4%	61	3.1%
Total Asian NICS	64	8.0%	78	9.6%	69	8.9%	86	10.6%	93	9.8%	118	10.4%	157	10.7%	197	10.0%
Other Developing Countries	49	6.2%	47	5.8%	44	5.7%	46	5.7%	50	5.2%	61	5.4%	77	5.3%	95	4.8%
Total Developing Countries	370	46.5%	378	46.4%	342	44.3%	361	44.6%	394	41.5%	469	41.7%	620	42.2%	751	38.3%
China	0	0.0%	1	0.1%	1	0.2%	2	0.3%	3	0.3%	5	0.4%	7	0.5%	12	0.6%
USSR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	0.3%	6	0.3%
Eastern Europe	2	0.2%	2	0.3%	2	0.3%	3	0.4%	1	0.1%	1	0.1%	2	0.1%	4	0.2%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	2	0.3%	3	0.4%	4	0.5%	6	0.7%	4	0.4%	6	0.5%	13	0.9%	22	1.1%
World	795	100.0%	813	100.0%	772	100.0%	809	100.0%	951	100.0%	1126	100.0%	1469	100.0%	1963	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.19
IMPORTS BY COUNTRY OF ORIGIN (MILLION DOLLARS)
SITC 55 ESSENTIAL OILS AND PERFUME MATERIALS; TOILET, POLISHING AND CLEANSING PREPARATIONS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	34	7.5%	41	6.5%	66	9.0%	81	9.2%	80	8.1%	95	8.1%	133	11.5%	168	12.7%
Japan	23	5.0%	30	4.8%	34	4.6%	45	5.1%	56	5.7%	74	6.3%	65	5.6%	65	4.9%
United Kingdom	31	6.8%	41	6.6%	61	8.2%	67	7.6%	66	6.7%	84	7.2%	56	4.8%	72	5.5%
Germany	43	9.6%	64	10.1%	67	9.1%	82	9.3%	92	9.4%	103	8.8%	79	6.8%	103	7.8%
Netherlands	9	2.0%	9	1.4%	14	1.8%	22	2.5%	18	1.9%	24	2.0%	17	1.4%	14	1.1%
France	157	34.8%	233	37.1%	250	34.0%	278	31.7%	328	33.4%	420	35.7%	448	38.5%	496	37.5%
Italy	10	2.2%	18	2.9%	22	3.0%	29	3.3%	38	3.9%	38	3.2%	33	2.9%	42	3.1%
Other E.C.	23	5.1%	33	5.3%	38	5.1%	38	4.3%	55	5.5%	49	4.2%	50	4.3%	51	3.8%
Total E.C.	273	60.5%	399	63.4%	451	61.2%	515	58.8%	598	60.9%	718	61.1%	682	58.6%	778	58.8%
Other Developed	26	5.8%	42	6.6%	44	5.9%	62	7.0%	62	6.3%	74	6.3%	70	6.0%	83	6.3%
Total Developed	355	78.7%	511	81.3%	595	80.7%	703	80.2%	796	81.0%	960	81.7%	951	81.7%	1094	82.6%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other OPEC	13	2.8%	14	2.2%	14	2.0%	24	2.7%	19	2.0%	23	1.9%	15	1.3%	25	1.9%
Total OPEC	13	2.8%	14	2.2%	14	2.0%	24	2.7%	19	2.0%	23	1.9%	15	1.3%	26	1.9%
Brazil	8	1.8%	13	2.0%	16	2.2%	14	1.6%	15	1.6%	24	2.0%	32	2.8%	22	1.6%
Mexico	17	3.7%	18	2.9%	17	2.3%	22	2.5%	33	3.4%	37	3.2%	39	3.3%	44	3.4%
Other Latin America	25	5.4%	25	4.0%	32	4.3%	39	4.4%	32	3.2%	36	3.1%	36	3.1%	47	3.6%
Total Latin America	50	11.0%	56	8.9%	65	8.8%	75	8.5%	80	8.2%	97	8.3%	107	9.2%	114	8.6%
South Korea	1	0.3%	2	0.3%	3	0.4%	6	0.7%	6	0.6%	6	0.5%	6	0.6%	8	0.6%
Singapore	2	0.5%	2	0.4%	3	0.4%	5	0.6%	8	0.8%	8	0.7%	6	0.5%	5	0.4%
Taiwan	2	0.5%	4	0.7%	13	1.8%	29	3.4%	30	3.1%	29	2.4%	30	2.6%	27	2.0%
Other Asian NICS	1	0.3%	3	0.5%	3	0.5%	3	0.4%	4	0.4%	5	0.4%	8	0.7%	7	0.6%
Total Asian NICS	7	1.6%	12	1.9%	22	3.0%	43	5.0%	48	4.9%	48	4.0%	50	4.3%	47	3.6%
Other Developing Countries	11	2.5%	20	3.2%	28	3.8%	24	2.8%	26	2.7%	27	2.3%	25	2.1%	33	2.5%
Total Developing Countries	80	17.8%	101	16.1%	126	17.1%	156	17.8%	169	17.2%	191	16.2%	193	16.6%	205	15.5%
China	15	3.3%	15	2.4%	15	2.0%	16	1.8%	16	1.6%	24	2.1%	20	1.7%	23	1.7%
USSR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Eastern Europe	1	0.3%	1	0.2%	1	0.1%	1	0.1%	1	0.1%	1	0.0%	1	0.1%	1	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	16	3.6%	17	2.7%	16	2.1%	17	1.9%	17	1.7%	25	2.1%	21	1.8%	24	1.8%
World	452	100.0%	629	100.0%	737	100.0%	876	100.0%	982	100.0%	1175	100.0%	1165	100.0%	1323	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.20
TRADE BALANCE (MILLION DOLLARS)
SITC 55 ESSENTIAL OILS AND PERFUME MATERIALS; TOILET, POLISHING AND CLEANSING PREPARATIONS

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990
Canada	84	76	36	24	60	70	82	234
Japan	35	44	37	33	68	37	97	184
United Kingdom	28	19	6	-2	7	17	67	55
Germany	-9	-39	-43	-57	-62	-63	-34	-32
Netherlands	15	15	10	7	16	20	26	35
France	-135	-208	-220	-254	-299	-378	-400	-437
Italy	-2	-11	-14	-20	-29	-21	-10	-16
Other E.C.	12	-4	-4	-6	-20	-6	10	27
Total E.C.	-90	-228	-265	-331	-388	-432	-341	-367
Other Developed	39	29	23	13	18	15	46	45
Total Developed	68	-79	-169	-260	-243	-309	-116	95
Saudi Arabia	39	31	28	20	24	21	23	33
Other OPEC	42	42	34	18	33	43	49	51
Total OPEC	80	72	62	38	58	64	72	83
Brazil	2	-6	-9	-4	-7	-14	-16	-6
Mexico	1	3	8	4	-7	-2	44	81
Other Latin America	137	140	111	114	134	148	186	189
Total Latin America	140	137	110	114	120	132	213	264
South Korea	10	12	9	10	13	22	33	43
Singapore	11	12	10	10	9	12	25	28
Taiwan	9	12	-1	-9	-11	-2	6	26
Other Asian NICS	27	30	28	32	34	38	43	54
Total Asian NICS	57	67	47	42	45	70	107	150
Other Developing Countries	38	27	16	22	23	34	53	62
Total Developing Countries	290	277	216	205	225	278	427	546
China	-15	-15	-13	-13	-13	-20	-13	-11
USSR	0	0	0	0	0	0	4	6
Eastern Europe	1	1	1	2	0	0	1	2
Other CPE	0	0	0	0	0	0	0	0
Total CPE	-14	-14	-12	-11	-13	-19	-8	-2
World	344	183	35	-67	-31	-50	304	639

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.21
EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 56 FERTILIZERS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	119	8.9%	200	9.1%	171	9.8%	106	11.5%	110	10.2%	115	9.6%	245	8.7%	188	7.3%
Japan	103	7.7%	156	7.1%	108	6.2%	48	5.1%	73	6.8%	79	6.6%	151	5.3%	160	6.2%
United Kingdom	1	0.1%	1	0.0%	1	0.0%	1	0.1%	2	0.2%	1	0.0%	5	0.2%	5	0.2%
Germany	24	1.8%	34	1.5%	30	1.7%	22	2.3%	20	1.8%	12	1.0%	41	1.4%	37	1.4%
Netherlands	0	0.0%	19	0.8%	19	1.1%	9	0.9%	10	0.9%	12	1.0%	37	1.3%	35	1.4%
France	15	1.1%	23	1.1%	28	1.6%	19	2.0%	45	4.1%	39	3.3%	70	2.5%	57	2.2%
Italy	34	2.5%	56	2.5%	36	2.0%	23	2.5%	35	3.2%	22	1.9%	33	1.2%	15	0.6%
Other EC	158	11.8%	178	8.1%	108	6.2%	60	6.5%	103	9.5%	67	5.6%	171	6.1%	121	4.7%
Total EC	232	17.4%	310	14.1%	222	12.7%	133	14.3%	214	19.7%	154	12.8%	357	12.6%	270	10.5%
Other Developed	120	9.0%	164	7.4%	139	7.9%	68	7.3%	91	8.4%	77	6.4%	214	7.6%	240	9.3%
Total Developed	573	43.0%	830	37.7%	640	36.6%	356	38.3%	488	45.0%	425	35.5%	967	34.3%	857	33.3%
Saudi Arabia	2	0.2%	4	0.2%	1	0.1%	5	0.5%	8	0.8%	8	0.7%	5	0.2%	15	0.6%
Other OPEC	33	2.5%	64	2.9%	33	1.9%	20	2.1%	50	4.6%	54	4.5%	97	3.4%	103	4.0%
Total OPEC	36	2.7%	68	3.1%	35	2.0%	25	2.7%	58	5.4%	62	5.1%	102	3.6%	119	4.6%
Brazil	19	1.4%	87	3.9%	45	2.6%	75	8.1%	51	4.7%	47	3.9%	52	1.8%	71	2.8%
Mexico	51	3.8%	82	3.7%	55	3.1%	24	2.6%	24	2.3%	13	1.1%	55	1.9%	44	1.7%
Other Latin America	156	11.7%	204	9.3%	184	10.5%	102	11.0%	120	11.1%	138	11.5%	287	10.2%	243	9.4%
Total Latin America	226	17.0%	373	16.9%	284	16.2%	201	21.6%	195	18.0%	197	16.5%	394	14.0%	358	13.9%
South Korea	3	0.2%	48	2.2%	46	2.6%	29	3.1%	31	2.9%	34	2.9%	62	2.2%	82	3.2%
Singapore	13	1.0%	5	0.2%	0	0.0%	2	0.2%	0	0.0%	0	0.0%	0	0.0%	1	0.0%
Taiwan	60	4.5%	116	5.3%	24	1.4%	1	0.1%	3	0.3%	1	0.1%	2	0.1%	2	0.1%
Other Asian NICS	0	0.0%	6	0.3%	22	1.3%	0	0.0%	1	0.1%	2	0.2%	7	0.3%	5	0.2%
Total Asian NICS	76	5.7%	176	8.0%	93	5.3%	32	3.4%	37	3.4%	38	3.2%	71	2.5%	90	3.5%
Other Developing Countries	179	13.5%	410	18.6%	442	25.3%	137	14.8%	77	7.1%	199	16.6%	595	21.1%	419	16.3%
Total Developing Countries	504	37.9%	1001	45.4%	835	47.7%	379	40.8%	337	31.1%	475	39.6%	1099	38.9%	434	16.9%
China	168	12.6%	267	12.1%	139	8.0%	46	5.0%	130	12.0%	182	15.2%	487	17.3%	544	21.1%
USSR	58	4.3%	47	2.1%	100	5.7%	126	13.5%	110	10.1%	107	8.9%	237	8.4%	201	7.8%
Eastern Europe	29	2.2%	58	2.6%	36	2.1%	23	2.4%	20	1.8%	10	0.8%	31	1.1%	12	0.5%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	254	19.1%	372	16.9%	276	15.8%	194	20.9%	259	23.9%	298	24.9%	755	26.8%	757	29.4%
World	1332	100.0%	2203	100.0%	1750	100.0%	929	100.0%	1084	100.0%	1199	100.0%	2821	100.0%	2575	100.0%

Source: U.S. Department of Commerce
Standard International Code, Revision 3

TABLE 3.22
IMPORTS BY COUNTRY OF ORIGIN (MILLION DOLLARS)
SITC 56 FERTILIZERS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	735	75.2%	831	74.5%	666	70.5%	569	68.0%	579	75.4%	715	72.2%	708	70.9%	751	78.6%
Japan	4	0.4%	5	0.4%	5	0.6%	3	0.3%	3	0.4%	4	0.4%	10	1.0%	7	0.7%
United Kingdom	1	0.1%	1	0.1%	1	0.1%	1	0.1%	3	0.4%	4	0.4%	3	0.3%	1	0.1%
Germany	15	1.6%	20	1.8%	18	1.9%	17	2.1%	19	2.4%	32	3.2%	18	1.8%	22	2.3%
Netherlands	44	4.5%	34	3.0%	53	5.6%	39	4.7%	27	3.5%	27	2.8%	33	3.3%	26	2.7%
France	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	0.4%	2	0.2%	3	0.3%
Italy	0	0.0%	6	0.5%	7	0.7%	10	1.2%	6	0.8%	13	1.3%	6	0.6%	6	0.7%
Other E.C.	11	1.2%	16	1.4%	12	1.2%	8	1.0%	6	0.7%	11	1.1%	8	0.8%	10	1.1%
Total E.C.	72	7.4%	77	6.9%	91	9.6%	76	9.1%	60	7.9%	91	9.2%	70	7.0%	68	7.1%
Other Developed	11	1.1%	14	1.2%	21	2.3%	13	1.6%	17	2.2%	21	2.2%	26	2.6%	20	2.1%
Total Developed	822	84.1%	926	83.1%	784	82.9%	661	79.0%	660	85.9%	832	83.9%	814	81.5%	846	88.5%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	4	0.5%	0	0.0%	0	0.0%	2	0.2%	3	0.3%
Other OPEC	24	2.5%	11	1.0%	10	1.1%	14	1.7%	25	3.2%	25	2.5%	39	3.9%	11	1.2%
Total OPEC	24	2.5%	11	1.0%	10	1.1%	18	2.2%	25	3.2%	25	2.5%	41	4.1%	15	1.5%
Brazil	5	0.5%	0	0.0%	1	0.1%	0	0.0%	0	0.1%	0	0.0%	5	0.5%	2	0.2%
Mexico	8	0.8%	4	0.4%	1	0.1%	3	0.3%	6	0.7%	3	0.3%	10	1.0%	15	1.5%
Other Latin America	24	2.4%	14	1.3%	10	1.1%	17	2.1%	25	3.3%	45	4.5%	32	3.2%	34	3.5%
Total Latin America	37	3.7%	19	1.7%	12	1.3%	20	2.4%	32	4.1%	48	4.9%	47	4.8%	50	5.3%
South Korea	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.1%
Singapore	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Taiwan	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other Asian NICS	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total Asian NICS	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.1%
Other Developing Countries	43	4.4%	39	3.5%	32	3.4%	21	2.6%	30	3.9%	47	4.8%	44	4.4%	30	3.2%
Total Developing Countries	89	9.1%	60	5.3%	54	5.7%	55	6.6%	80	10.4%	106	10.7%	123	12.3%	86	9.0%
China	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.1%	0	0.0%	2	0.2%	0	0.0%
USSR	43	4.4%	54	4.8%	57	6.0%	60	7.1%	11	1.4%	24	2.4%	9	0.9%	1	0.2%
Eastern Europe	24	2.5%	75	6.7%	50	5.3%	61	7.3%	17	2.2%	29	2.9%	52	5.2%	22	2.3%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	67	6.9%	129	11.5%	108	11.4%	120	14.4%	28	3.7%	53	5.4%	62	6.3%	24	2.5%
World	977	100.0%	1115	100.0%	945	100.0%	837	100.0%	768	100.0%	991	100.0%	999	100.0%	955	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.23
TRADE BALANCE (MILLION DOLLARS)
SITC 56 FERTILIZERS

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990
Canada	-616	-631	-495	-463	-469	-600	-463	-563
Japan	99	151	103	45	70	76	141	153
United Kingdom	0	0	-1	-1	-1	-4	2	4
Germany	9	13	12	4	1	-19	23	15
Netherlands	-44	-15	-34	-30	-17	-15	4	9
France	15	23	28	19	45	36	68	53
Italy	34	50	29	13	28	9	27	9
Other E.C.	146	163	96	52	97	56	163	111
Total E.C.	160	233	131	57	154	62	287	202
Other Developed	109	150	117	55	74	56	188	220
Total Developed	-248	-96	-144	-306	-171	-406	153	12
Saudi Arabia	2	4	1	1	8	8	4	12
Other OPEC	9	53	23	6	25	29	57	92
Total OPEC	11	58	25	6	34	37	61	104
Brazil	13	86	45	75	50	46	47	69
Mexico	44	78	54	22	19	10	45	29
Other Latin America	133	190	173	85	95	93	255	209
Total Latin America	190	354	272	181	164	149	347	308
South Korea	3	48	46	29	31	34	61	81
Singapore	13	5	0	2	0	0	0	1
Taiwan	60	116	24	1	3	1	2	2
Other Asian NICS	0	6	22	0	1	2	7	5
Total Asian NICS	76	176	93	32	37	38	71	89
Other Developing Countries	136	371	411	116	47	151	551	389
Total Developing Countries	416	942	781	324	257	369	976	349
China	168	267	139	46	129	182	486	544
USSR	15	-7	43	66	99	83	228	200
Eastern Europe	5	-17	-14	-38	3	-19	-21	-10
Other CPE	0	0	0	0	0	0	0	0
Total CPE	187	243	168	74	231	245	693	733
World	355	1089	805	92	317	208	1822	1619

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.24
EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 57 PLASTICS IN PRIMARY FORMS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	381	13.9%	394	13.5%	374	13.7%	387	12.4%	552	13.7%	625	11.4%	704	12.3%	1175	18.3%
Japan	252	9.2%	276	9.4%	223	8.2%	234	7.5%	294	7.3%	397	7.2%	443	7.7%	447	7.0%
United Kingdom	120	4.4%	134	4.6%	113	4.1%	122	3.9%	149	3.7%	172	3.1%	230	4.0%	256	4.0%
Germany	61	2.2%	66	2.3%	88	3.2%	110	3.5%	110	2.7%	138	2.5%	180	3.1%	204	3.2%
Netherlands	137	5.0%	196	6.7%	198	7.3%	196	6.3%	207	5.1%	311	5.7%	370	6.5%	478	7.4%
France	36	1.3%	31	1.1%	34	1.2%	40	1.3%	46	1.1%	55	1.0%	81	1.4%	83	1.3%
Italy	20	0.7%	30	1.0%	29	1.1%	34	1.1%	49	1.2%	62	1.1%	74	1.3%	55	0.9%
Other E.C.	213	7.8%	232	7.9%	229	8.4%	261	8.4%	300	7.4%	388	7.0%	462	8.1%	526	8.2%
Total E.C.	588	21.5%	689	23.6%	691	25.3%	763	24.4%	861	21.4%	1125	20.4%	1397	24.4%	1603	24.9%
Other Developed	158	5.8%	158	5.4%	155	5.7%	163	5.2%	219	5.4%	287	5.2%	347	6.1%	308	4.8%
Total Developed	1379	50.4%	1517	51.9%	1443	52.9%	1547	49.6%	1927	47.8%	2434	44.2%	2891	50.5%	3533	55.0%
Saudi Arabia	40	1.4%	37	1.3%	30	1.1%	20	0.7%	19	0.5%	30	0.5%	21	0.4%	22	0.3%
Other OPEC	181	6.6%	185	6.3%	156	5.7%	214	6.9%	230	5.7%	276	5.0%	244	4.3%	246	3.8%
Total OPEC	220	8.0%	222	7.6%	186	6.8%	235	7.5%	249	6.2%	306	5.6%	265	4.6%	269	4.2%
Brazil	49	1.8%	40	1.4%	44	1.6%	55	1.8%	53	1.3%	59	1.1%	99	1.7%	84	1.3%
Mexico	230	8.4%	209	7.1%	250	9.2%	264	8.5%	296	7.3%	409	7.4%	542	9.5%	533	8.3%
Other Latin America	289	10.6%	314	10.7%	269	9.9%	346	11.1%	466	11.6%	580	10.5%	503	8.8%	534	8.3%
Total Latin America	569	20.8%	563	19.2%	564	20.6%	665	21.3%	815	20.2%	1049	19.1%	1145	20.0%	1151	17.9%
South Korea	95	3.5%	102	3.5%	80	2.9%	121	3.9%	183	4.5%	212	3.8%	242	4.2%	264	4.1%
Singapore	55	2.0%	44	1.5%	27	1.0%	42	1.4%	67	1.7%	99	1.8%	141	2.5%	143	2.2%
Taiwan	97	3.5%	93	3.2%	67	2.4%	119	3.8%	210	5.2%	282	5.1%	284	5.0%	255	4.0%
Other Asian NICS	87	3.2%	94	3.2%	82	3.0%	146	4.7%	238	5.9%	432	7.9%	316	5.5%	360	5.6%
Total Asian NICS	333	12.2%	332	11.3%	256	9.4%	428	13.7%	698	17.3%	1025	18.6%	983	17.2%	1022	15.9%
Other Developing Countries	199	7.3%	141	4.8%	124	4.5%	150	4.8%	219	5.4%	275	5.0%	326	5.7%	398	6.2%
Total Developing Countries	1262	46.1%	1171	40.0%	1056	38.7%	1380	44.2%	1863	46.2%	2488	45.2%	2620	45.8%	2729	42.5%
China	92	3.4%	234	8.0%	226	8.3%	191	6.1%	239	5.9%	575	10.5%	197	3.4%	151	2.4%
USSR	3	0.1%	4	0.1%	3	0.1%	2	0.1%	1	0.0%	1	0.0%	10	0.2%	13	0.2%
Eastern Europe	1	0.0%	1	0.0%	2	0.1%	1	0.0%	2	0.1%	4	0.1%	8	0.1%	2	0.0%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.0%	0	0.0%	0	0.0%
Total CPE	96	3.5%	238	8.1%	231	8.5%	194	6.2%	243	6.0%	581	10.6%	215	3.8%	166	2.6%
World	2737	100.0%	2926	100.0%	2730	100.0%	3121	100.0%	4033	100.0%	5503	100.0%	5727	100.0%	6429	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.25
IMPORTS BY COUNTRY OF ORIGIN(MILLION DOLLARS)
SITC 57 PLASTICS IN PRIMARY FORMS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	90	16.6%	143	18.4%	185	21.5%	228	22.6%	281	25.3%	445	32.4%	496	29.4%	610	30.9%
Japan	142	26.2%	179	23.1%	185	21.5%	190	18.9%	219	19.7%	219	15.9%	305	18.0%	315	16.0%
United Kingdom	35	6.5%	51	6.5%	61	7.1%	89	8.8%	86	7.7%	105	7.6%	138	8.2%	130	6.6%
Germany	95	17.6%	119	15.3%	122	14.2%	149	14.8%	174	15.6%	186	13.5%	232	13.7%	243	12.3%
Netherlands	18	3.3%	29	3.8%	43	5.0%	42	4.1%	43	3.9%	52	3.8%	61	3.6%	73	3.7%
France	39	7.3%	50	6.4%	68	7.8%	69	6.9%	63	5.7%	70	5.1%	86	5.1%	94	4.8%
Italy	14	2.6%	19	2.4%	22	2.6%	26	2.6%	27	2.5%	26	1.9%	46	2.7%	63	3.2%
Other E.C.	15	2.9%	26	3.4%	28	3.3%	34	3.4%	36	3.3%	37	2.7%	78	4.6%	80	4.0%
Total E.C.	217	40.1%	294	37.8%	344	40.0%	409	40.7%	429	38.5%	476	34.6%	640	37.9%	683	34.6%
Other Developed	14	2.6%	21	2.7%	26	3.0%	29	2.9%	32	2.8%	37	2.7%	60	3.6%	74	3.7%
Total Developed	462	85.5%	637	82.0%	740	85.9%	857	85.2%	961	86.3%	1176	85.7%	1501	89.0%	1683	85.2%
Saudi Arabia	0	0.0%	0	0.0%	3	0.3%	11	1.1%	4	0.4%	7	0.5%	3	0.2%	4	0.2%
Other OPEC	0	0.0%	4	0.5%	2	0.2%	1	0.1%	0	0.0%	0	0.0%	4	0.3%	10	0.5%
Total OPEC	0	0.0%	4	0.5%	4	0.5%	12	1.2%	4	0.4%	8	0.5%	8	0.5%	14	0.7%
Brazil	8	1.5%	37	4.7%	15	1.7%	18	1.8%	12	1.1%	21	1.5%	28	1.6%	36	1.8%
Mexico	21	3.8%	35	4.5%	36	4.1%	35	3.4%	49	4.4%	68	5.0%	35	2.1%	31	1.6%
Other Latin America	14	2.7%	23	2.9%	13	1.5%	14	1.3%	7	0.6%	20	1.5%	28	1.6%	25	1.3%
Total Latin America	43	8.0%	94	12.1%	63	7.3%	66	6.6%	68	6.1%	109	7.9%	91	5.4%	92	4.6%
South Korea	5	0.9%	7	0.8%	8	1.0%	11	1.1%	12	1.1%	6	0.5%	14	0.8%	63	3.2%
Singapore	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.1%	2	0.1%	44	2.2%
Taiwan	21	3.9%	23	3.0%	29	3.4%	43	4.3%	45	4.0%	44	3.2%	47	2.8%	51	2.6%
Other Asian NICS	0	0.0%	1	0.1%	1	0.1%	1	0.1%	1	0.1%	1	0.0%	1	0.1%	1	0.0%
Total Asian NICS	26	4.8%	31	3.9%	39	4.5%	56	5.6%	58	5.2%	52	3.8%	64	3.8%	158	8.0%
Other Developing Countries	6	1.2%	8	1.0%	11	1.2%	11	1.1%	18	1.6%	18	1.3%	18	1.1%	19	1.0%
Total Developing Countries	76	14.0%	132	17.1%	115	13.4%	144	14.3%	148	13.3%	186	13.5%	176	10.4%	274	13.9%
China	2	0.4%	5	0.6%	2	0.2%	3	0.3%	3	0.3%	8	0.6%	9	0.5%	12	0.6%
USSR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Eastern Europe	1	0.1%	3	0.4%	4	0.5%	2	0.2%	1	0.1%	3	0.2%	1	0.1%	5	0.3%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	3	0.5%	7	0.9%	6	0.7%	5	0.5%	5	0.4%	11	0.8%	10	0.6%	17	0.9%
World	541	100.0%	777	100.0%	861	100.0%	1006	100.0%	1113	100.0%	1373	100.0%	1687	100.0%	1974	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.26
TRADE BALANCE (MILLION DOLLARS)
SITC 57 PLASTICS IN PRIMARY FORM

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990
Canada	291	251	189	159	270	181	208	565
Japan	111	97	38	44	76	178	139	132
United Kingdom	85	83	52	33	63	67	92	126
Germany	-34	-53	-33	-39	-64	-48	-52	-39
Netherlands	119	166	155	154	164	259	309	405
France	-3	-18	-34	-29	-17	-15	-5	-10
Italy	6	11	7	8	22	36	29	-8
Other E.C.	197	206	200	226	264	351	384	446
Total E.C.	371	396	347	353	432	650	757	919
Other Developed	144	137	129	134	188	250	287	234
Total Developed	917	881	703	690	966	1259	1390	1850
Saudi Arabia	40	37	27	10	15	23	18	18
Other OPEC	181	181	154	213	230	276	239	236
Total OPEC	220	218	181	223	245	299	257	254
Brazil	41	3	30	37	41	38	71	48
Mexico	210	174	215	230	247	341	507	502
Other Latin America	275	292	256	332	459	560	476	509
Total Latin America	525	469	501	599	747	940	1054	1059
South Korea	90	95	72	110	171	205	228	201
Singapore	55	44	27	42	67	98	139	100
Taiwan	76	70	37	75	165	238	237	204
Other Asian NICS	87	93	81	145	237	432	315	359
Total Asian NICS	307	301	217	372	640	974	919	864
Other Developing Countries	193	134	113	139	202	257	307	378
Total Developing Countries	1187	1038	941	1236	1716	2302	2444	2455
China	90	229	225	188	236	567	188	140
USSR	3	4	3	2	1	1	10	12
Eastern Europe	1	-2	-3	-1	1	1	7	-3
Other CPE	0	0	0	0	0	1	0	0
Total CPE	93	231	225	188	238	570	206	149
World	2197	2149	1869	2114	2920	4130	4040	4454

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.27
EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 58 PLASTICS IN NON-PRIMARY FORMS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	328	26.3%	350	25.5%	304	23.9%	291	21.0%	395	23.8%	445	22.3%	433	19.7%	735	27.9%
Japan	96	7.7%	103	7.5%	103	8.1%	112	8.0%	141	8.5%	162	8.1%	188	8.5%	195	7.4%
United Kingdom	66	5.3%	79	5.8%	76	6.0%	88	6.4%	90	5.4%	113	5.7%	135	6.1%	135	5.1%
Germany	59	4.7%	72	5.3%	72	5.7%	102	7.4%	98	5.9%	132	6.6%	100	4.5%	142	5.4%
Netherlands	23	1.8%	26	1.9%	33	2.6%	44	3.2%	51	3.1%	63	3.1%	87	3.9%	115	4.4%
France	40	3.2%	42	3.0%	39	3.1%	41	3.0%	51	3.1%	51	2.6%	60	2.7%	69	2.6%
Italy	14	1.1%	17	1.2%	19	1.5%	19	1.4%	23	1.4%	29	1.4%	47	2.1%	58	2.2%
Other E.C.	104	8.4%	122	8.9%	100	7.8%	108	7.8%	132	8.0%	131	6.5%	188	8.5%	182	6.9%
Total E.C.	307	24.6%	358	26.1%	338	26.6%	403	29.0%	446	26.9%	519	26.0%	616	28.0%	700	26.6%
Other Developed	115	9.3%	134	9.8%	111	8.7%	127	9.2%	142	8.6%	164	8.2%	196	8.9%	199	7.6%
Total Developed	846	67.8%	946	68.8%	856	67.3%	933	67.3%	1124	67.7%	1290	64.5%	1432	65.1%	1829	69.5%
Saudi Arabia	42	3.4%	24	1.8%	16	1.3%	9	0.7%	10	0.6%	15	0.7%	18	0.8%	20	0.8%
Other OPEC	41	3.3%	46	3.4%	28	2.2%	25	1.8%	26	1.6%	30	1.5%	42	1.9%	43	1.6%
Total OPEC	83	6.7%	71	5.1%	44	3.4%	35	2.5%	36	2.2%	45	2.2%	61	2.8%	63	2.4%
Brazil	16	1.3%	22	1.6%	20	1.6%	28	2.0%	21	1.2%	28	1.4%	34	1.5%	34	1.3%
Mexico	71	5.7%	103	7.5%	136	10.7%	145	10.5%	184	11.1%	277	13.9%	281	12.7%	320	12.2%
Other Latin America	110	8.8%	113	8.2%	84	6.6%	89	6.4%	95	5.7%	102	5.1%	113	5.1%	116	4.4%
Total Latin America	197	15.8%	238	17.3%	240	18.9%	262	18.9%	300	18.1%	408	20.4%	427	19.4%	470	17.9%
South Korea	11	0.9%	17	1.2%	11	0.9%	14	1.0%	25	1.5%	41	2.0%	47	2.2%	62	2.3%
Singapore	13	1.0%	15	1.1%	16	1.2%	15	1.1%	18	1.1%	24	1.2%	58	2.6%	43	1.6%
Taiwan	9	0.8%	11	0.8%	10	0.8%	19	1.4%	29	1.7%	38	1.9%	42	1.9%	46	1.7%
Other Asian NICS	14	1.1%	13	1.0%	14	1.1%	19	1.4%	26	1.6%	51	2.6%	44	2.0%	49	1.9%
Total Asian NICS	48	3.8%	55	4.0%	52	4.1%	67	4.9%	98	5.9%	154	7.7%	191	8.7%	200	7.6%
Other Developing Countries	33	2.6%	37	2.7%	27	2.1%	32	2.3%	37	2.3%	46	2.3%	49	2.2%	58	2.2%
Total Developing Countries	335	26.9%	368	26.8%	345	27.1%	381	27.4%	454	27.3%	633	31.6%	716	32.5%	773	29.4%
China	1	0.1%	2	0.1%	3	0.2%	4	0.3%	16	0.9%	21	1.1%	16	0.7%	11	0.4%
USSR	64	5.1%	57	4.1%	66	5.2%	59	4.3%	65	3.9%	55	2.8%	37	1.7%	18	0.7%
Eastern Europe	2	0.1%	2	0.1%	2	0.2%	10	0.7%	1	0.1%	2	0.1%	1	0.0%	2	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	66	5.3%	60	4.4%	71	5.6%	74	5.3%	82	4.9%	78	3.9%	54	2.4%	31	1.2%
World	1247	100.0%	1374	100.0%	1272	100.0%	1387	100.0%	1660	100.0%	2001	100.0%	2202	100.0%	2633	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code. Revision 3

TABLE 3.28
IMPORTS BY COUNTRY OF ORIGIN(MILLION DOLLARS)
SITC 58 PLASTICS IN NON-PRIMARY FORMS

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	150	19.9%	197	20.6%	196	19.4%	226	19.3%	262	19.7%	347	22.0%	356	21.9%	403	22.7%
Japan	136	18.0%	183	19.1%	209	20.7%	264	22.6%	301	22.7%	338	21.5%	339	20.8%	369	20.8%
United Kingdom	63	8.4%	59	6.2%	60	5.9%	62	5.3%	76	5.7%	98	6.2%	91	5.6%	109	6.1%
Germany	108	14.3%	120	12.6%	125	12.4%	143	12.2%	150	11.3%	170	10.8%	189	11.6%	207	11.7%
Netherlands	4	0.5%	7	0.7%	10	1.0%	10	0.9%	14	1.1%	20	1.2%	19	1.2%	22	1.2%
France	18	2.3%	27	2.8%	27	2.7%	37	3.2%	34	2.6%	31	2.0%	45	2.8%	43	2.4%
Italy	34	4.5%	44	4.6%	42	4.1%	43	3.7%	46	3.4%	57	3.6%	49	3.0%	40	2.3%
Other E.C.	32	4.2%	39	4.1%	46	4.6%	44	3.8%	57	4.3%	48	3.1%	48	3.0%	55	3.1%
Total E.C.	259	34.3%	296	31.0%	309	30.7%	339	29.0%	377	28.4%	424	27.0%	442	27.1%	476	26.9%
Other Developed	25	3.4%	36	3.8%	37	3.7%	44	3.8%	46	3.5%	53	3.3%	56	3.4%	68	3.8%
Total Developed	570	75.6%	712	74.5%	751	74.5%	873	74.6%	987	74.3%	1162	73.8%	1193	73.2%	1317	74.3%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other OPEC	0	0.0%	0	0.0%	1	0.1%	0	0.0%	0	0.0%	1	0.1%	2	0.1%	4	0.2%
Total OPEC	0	0.0%	0	0.0%	1	0.1%	0	0.0%	0	0.0%	1	0.1%	2	0.1%	4	0.2%
Brazil	7	0.9%	13	1.4%	13	1.3%	13	1.1%	13	1.0%	29	1.8%	20	1.3%	24	1.4%
Mexico	15	2.0%	23	2.4%	32	3.2%	45	3.9%	49	3.7%	57	3.6%	59	3.6%	76	4.3%
Other Latin America	8	1.0%	8	0.8%	9	0.9%	10	0.8%	12	0.9%	12	0.8%	29	1.8%	31	1.7%
Total Latin America	29	3.9%	44	4.6%	55	5.4%	68	5.8%	74	5.6%	98	6.2%	108	6.6%	131	7.4%
South Korea	8	1.1%	17	1.8%	24	2.4%	39	3.3%	49	3.7%	79	5.0%	74	4.5%	77	4.4%
Singapore	0	0.0%	0	0.0%	1	0.1%	2	0.2%	3	0.2%	3	0.2%	6	0.4%	7	0.4%
Taiwan	130	17.2%	152	16.0%	144	14.2%	152	13.0%	173	13.0%	184	11.7%	195	12.0%	183	10.3%
Other Asian NICS	2	0.3%	3	0.3%	3	0.3%	3	0.3%	3	0.2%	3	0.2%	2	0.1%	2	0.1%
Total Asian NICS	140	18.6%	173	18.1%	171	17.0%	196	16.8%	228	17.1%	268	17.0%	276	16.9%	269	15.2%
Other Developing Countries	13	1.7%	24	2.5%	29	2.9%	32	2.7%	37	2.8%	44	2.8%	50	3.1%	52	3.0%
Total Developing Countries	183	24.3%	242	25.3%	257	25.4%	296	25.3%	338	25.5%	411	26.1%	435	26.7%	454	25.6%
China	0	0.0%	0	0.0%	0	0.0%	1	0.1%	1	0.1%	1	0.1%	1	0.0%	1	0.1%
USSR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Eastern Europe	1	0.1%	1	0.1%	1	0.1%	1	0.1%	1	0.1%	1	0.1%	1	0.1%	1	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	1	0.1%	1	0.1%	1	0.1%	2	0.1%	2	0.2%	2	0.1%	2	0.1%	2	0.1%
World	754	100.0%	956	100.0%	1009	100.0%	1171	100.0%	1327	100.0%	1574	100.0%	1629	100.0%	1773	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.29
TRADE BALANCE (MILLION DOLLARS)
SITC 58 PLASTICS IN NON-PRIMARY FORMS

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990
Canada	177	153	108	66	133	99	77	331
Japan	-40	-80	-106	-152	-161	-176	-151	-175
United Kingdom	3	20	16	26	14	15	43	26
Germany	-49	-48	-53	-40	-51	-37	-89	-65
Netherlands	19	19	23	33	37	43	67	93
France	23	15	12	4	16	20	15	26
Italy	-20	-27	-23	-24	-22	-29	-2	18
Other E.C.	73	83	53	64	75	83	140	127
Total E.C.	48	62	29	63	69	95	174	224
Other Developed	90	98	74	83	96	111	140	131
Total Developed	276	234	105	59	138	128	239	512
Saudi Arabia	42	24	16	9	10	15	18	20
Other OPEC	41	46	26	25	26	29	41	40
Total OPEC	83	70	42	34	36	44	59	60
Brazil	10	9	7	15	8	0	13	10
Mexico	56	80	104	100	136	221	222	244
Other Latin America	102	105	75	80	83	90	84	86
Total Latin America	168	194	186	195	226	310	320	339
South Korea	3	-1	-13	-25	-25	-38	-26	-16
Singapore	13	14	15	13	16	22	52	36
Taiwan	-120	-142	-133	-133	-144	-146	-154	-137
Other Asian NICS	12	10	12	16	23	49	42	47
Total Asian NICS	-93	-118	-120	-129	-130	-114	-85	-70
Other Developing Countries	20	13	-2	0	0	2	-1	5
Total Developing Countries	152	126	88	85	115	222	281	319
China	1	2	3	3	15	20	16	10
USSR	64	57	66	59	65	55	37	18
Eastern Europe	1	0	2	9	0	1	0	1
Other CPE	0	0	0	0	0	0	0	0
Total CPE	65	59	70	72	80	76	52	29
World	493	419	263	216	333	426	572	860

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.30
EXPORTS BY COUNTRY OF DESTINATION (MILLION DOLLARS)
SITC 59 CHEMICAL MATERIALS AND PRODUCTS NOT ELSEWHERE SPECIFIED

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	392	15.0%	464	16.3%	444	17.2%	394	14.4%	461	14.8%	567	15.2%	694	15.1%	1097	20.0%
Japan	254	9.7%	273	9.6%	289	11.2%	293	10.7%	307	9.9%	358	9.6%	536	11.7%	564	10.3%
United Kingdom	96	3.7%	100	3.5%	101	3.9%	103	3.8%	153	4.9%	196	5.3%	224	4.9%	208	3.8%
Germany	73	2.8%	84	3.0%	84	3.3%	95	3.5%	95	3.0%	125	3.4%	147	3.2%	270	4.9%
Netherlands	133	5.1%	122	4.3%	102	4.0%	122	4.5%	144	4.6%	180	4.8%	179	3.9%	266	4.9%
France	78	3.0%	69	2.4%	82	3.2%	95	3.5%	124	4.0%	161	4.3%	199	4.4%	300	5.5%
Italy	34	1.3%	38	1.4%	37	1.4%	50	1.8%	44	1.4%	57	1.5%	65	1.4%	110	2.0%
Other E.C.	257	9.9%	272	9.5%	272	10.5%	347	12.6%	384	12.3%	448	12.0%	490	10.7%	452	8.3%
Total E.C.	637	24.4%	646	22.7%	641	24.8%	763	27.8%	899	28.8%	1110	29.8%	1239	27.0%	1607	29.3%
Other Developed	254	9.7%	313	11.0%	213	8.3%	238	8.7%	287	9.2%	343	9.2%	430	9.4%	374	6.8%
Total Developed	1537	58.9%	1696	59.5%	1586	61.5%	1689	61.6%	1955	62.7%	2378	63.8%	2899	63.3%	3641	66.5%
Saudi Arabia	53	2.0%	52	1.8%	37	1.4%	39	1.4%	54	1.7%	44	1.2%	51	1.1%	69	1.3%
Other OPEC	147	5.6%	175	6.1%	171	6.6%	156	5.7%	177	5.7%	206	5.5%	225	4.9%	238	4.3%
Total OPEC	199	7.6%	227	8.0%	208	8.1%	195	7.1%	231	7.4%	250	6.7%	276	6.0%	307	5.6%
Brazil	110	4.2%	86	3.0%	73	2.8%	103	3.8%	84	2.7%	96	2.6%	106	2.3%	108	2.0%
Mexico	83	3.2%	98	3.4%	109	4.2%	103	3.8%	104	3.3%	130	3.5%	208	4.5%	252	4.6%
Other Latin America	328	12.6%	382	13.4%	318	12.3%	347	12.7%	368	11.8%	399	10.7%	474	10.3%	485	8.9%
Total Latin America	520	19.9%	567	19.9%	500	19.4%	554	20.2%	556	17.8%	625	16.8%	788	17.2%	844	15.4%
South Korea	46	1.7%	46	1.6%	36	1.4%	52	1.9%	58	1.9%	80	2.1%	167	3.7%	206	3.8%
Singapore	97	3.7%	113	4.0%	95	3.7%	99	3.6%	121	3.9%	123	3.3%	156	3.4%	175	3.2%
Taiwan	42	1.6%	39	1.4%	32	1.2%	41	1.5%	57	1.8%	60	1.6%	95	2.1%	94	1.7%
Other Asian NICS	22	0.8%	31	1.1%	24	0.9%	24	0.9%	45	1.5%	59	1.6%	38	0.8%	40	0.7%
Total Asian NICS	206	7.9%	229	8.0%	187	7.3%	216	7.9%	282	9.0%	322	8.6%	455	9.9%	515	9.4%
Other Developing Countries	157	6.0%	191	6.7%	139	5.4%	140	5.1%	160	5.1%	197	5.3%	223	4.9%	234	4.3%
Total Developing Countries	1014	38.9%	1101	38.6%	943	36.5%	1002	36.5%	1110	35.6%	1274	34.2%	1633	35.6%	1792	32.7%
China	37	1.4%	20	0.7%	23	0.9%	24	0.9%	29	0.9%	40	1.1%	37	0.8%	33	0.6%
USSR	6	0.2%	8	0.3%	10	0.4%	8	0.3%	8	0.3%	19	0.5%	9	0.2%	4	0.1%
Eastern Europe	7	0.3%	14	0.5%	10	0.4%	9	0.3%	6	0.2%	8	0.2%	5	0.1%	7	0.1%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	50	1.9%	42	1.5%	43	1.7%	41	1.5%	44	1.4%	66	1.8%	51	1.1%	44	0.8%
World	2608	100.0%	2849	100.0%	2581	100.0%	2742	100.0%	3118	100.0%	3725	100.0%	4583	100.0%	5478	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.31
IMPORTS BY COUNTRY OF ORIGIN (MILLION DOLLARS)
SITC 59 CHEMICAL MATERIALS AND PRODUCTS NOT ELSEWHERE SPECIFIED

Country/Year	1983		1984		1985		1986		1987		1988		1989		1990	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Canada	101	10.5%	117	10.1%	126	9.1%	144	11.1%	166	11.7%	172	10.3%	201	11.3%	237	11.7%
Japan	107	11.1%	143	12.3%	148	10.7%	193	14.9%	235	16.5%	301	18.1%	197	11.1%	250	12.3%
United Kingdom	51	5.3%	58	5.0%	80	5.8%	96	7.4%	105	7.4%	119	7.2%	161	9.0%	158	7.8%
Germany	96	10.0%	126	10.9%	121	8.7%	148	11.4%	205	14.4%	235	14.1%	295	16.6%	350	17.2%
Netherlands	36	3.7%	43	3.7%	51	3.7%	62	4.8%	62	4.3%	72	4.3%	97	5.5%	107	5.3%
France	53	5.6%	57	4.9%	56	4.0%	75	5.8%	88	6.2%	114	6.8%	118	6.6%	127	6.3%
Italy	12	1.3%	29	2.5%	25	1.8%	29	2.2%	32	2.3%	29	1.8%	33	1.9%	42	2.1%
Other E.C.	71	7.4%	78	6.8%	115	8.3%	110	8.5%	138	9.7%	176	10.6%	215	12.1%	206	10.1%
Total E.C.	319	33.1%	392	33.9%	446	32.2%	520	40.1%	631	44.3%	746	44.8%	918	51.6%	990	48.8%
Other Developed	167	17.4%	182	15.7%	190	13.7%	187	14.4%	181	12.7%	191	11.4%	223	12.6%	264	13.0%
Total Developed	693	72.0%	833	72.1%	910	65.7%	1044	80.5%	1213	85.1%	1409	84.6%	1540	86.5%	1741	85.8%
Saudi Arabia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other OPEC	137	14.2%	2	0.2%	6	0.4%	9	0.7%	7	0.5%	20	1.2%	1	0.1%	2	0.1%
Total OPEC	137	14.2%	2	0.2%	6	0.4%	9	0.7%	7	0.5%	20	1.2%	1	0.1%	2	0.1%
Brazil	11	1.1%	19	1.7%	97	7.0%	24	1.9%	20	1.4%	31	1.9%	27	1.5%	24	1.2%
Mexico	6	0.6%	145	12.5%	138	10.0%	19	1.5%	13	0.9%	17	1.0%	28	1.5%	52	2.5%
Other Latin America	157	16.3%	23	2.0%	35	2.5%	35	2.7%	29	2.0%	48	2.9%	21	1.2%	28	1.4%
Total Latin America	173	18.0%	188	16.2%	270	19.5%	79	6.1%	62	4.3%	96	5.8%	75	4.2%	104	5.1%
South Korea	1	0.1%	3	0.3%	1	0.1%	7	0.5%	7	0.5%	4	0.2%	2	0.1%	4	0.2%
Singapore	1	0.1%	3	0.2%	2	0.1%	1	0.1%	0	0.0%	3	0.2%	0	0.0%	0	0.0%
Taiwan	6	0.6%	7	0.6%	11	0.8%	9	0.7%	8	0.6%	10	0.6%	11	0.6%	1	0.1%
Other Asian NICS	3	0.3%	4	0.4%	6	0.5%	9	0.7%	11	0.7%	10	0.6%	6	0.3%	6	0.3%
Total Asian NICS	11	1.1%	17	1.5%	20	1.5%	25	1.9%	27	1.9%	26	1.6%	19	1.0%	22	1.1%
Other Developing Countries	34	3.5%	74	6.4%	63	4.5%	51	3.9%	51	3.6%	60	3.6%	73	4.1%	84	4.1%
Total Developing Countries	226	23.5%	280	24.2%	356	25.7%	156	12.0%	141	9.9%	183	11.0%	167	9.4%	211	10.4%
China	38	4.0%	39	3.3%	45	3.3%	52	4.0%	60	4.2%	54	3.2%	60	3.4%	61	3.0%
USSR	1	0.1%	0	0.0%	0	0.0%	1	0.0%	0	0.0%	1	0.0%	0	0.0%	1	0.0%
Eastern Europe	4	0.4%	4	0.4%	74	5.4%	45	3.5%	10	0.7%	18	1.1%	11	0.7%	14	0.7%
Other CPE	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total CPE	43	4.5%	43	3.7%	119	8.6%	98	7.5%	71	5.0%	73	4.4%	72	4.1%	76	3.8%
World	962	100.0%	1156	100.0%	1385	100.0%	1298	100.0%	1425	100.0%	1665	100.0%	1780	100.0%	2028	100.0%

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.32
TRADE BALANCE (MILLION DOLLARS)
SITC 59 CHEMICAL MATERIALS AND PRODUCTS NOT ELSEWHERE CLASSIFIED

Country/Year	1983	1984	1985	1986	1987	1988	1989	1990
Canada	291	347	318	250	295	395	492	860
Japan	147	130	141	100	72	57	339	313
United Kingdom	46	42	21	8	48	77	63	50
Germany	-23	-42	-37	-52	-111	-110	-148	-80
Netherlands	97	79	51	60	82	108	82	159
France	24	12	26	20	36	47	81	173
Italy	22	10	12	21	12	28	32	68
Other E.C.	186	193	157	237	246	271	275	247
Total E.C.	318	254	194	243	269	365	320	617
Other Developed	87	131	24	51	106	153	207	109
Total Developed	843	863	676	644	742	969	1359	1900
Saudi Arabia	53	52	37	39	54	44	51	69
Other OPEC	10	173	166	148	170	186	224	235
Total OPEC	63	225	203	187	224	231	275	304
Brazil	99	67	-24	79	64	65	79	83
Mexico	76	-47	-29	84	91	112	180	200
Other Latin America	171	359	284	312	339	351	454	457
Total Latin America	347	379	231	475	494	528	713	741
South Korea	45	43	35	45	51	76	165	202
Singapore	95	110	93	99	121	120	155	175
Taiwan	36	32	21	32	49	50	84	93
Other Asian NICS	19	27	18	16	35	50	32	33
Total Asian NICS	195	212	167	191	255	296	437	493
Other Developing Countries	124	117	76	89	109	137	150	151
Total Developing Countries	788	822	587	846	969	1091	1466	1582
China	-1	-18	-22	-28	-31	-13	-23	-28
USSR	5	8	10	7	8	18	8	3
Eastern Europe	3	10	-64	-36	-4	-10	-6	-8
Other CPE	0	0	0	0	0	0	0	0
Total CPE	7	-1	-76	-57	-27	-6	-21	-32
World	1646	1693	1196	1444	1693	2060	2803	3450

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.33
U.S. CHEMICALS TRADE WITH CANADA (MILLION DOLLARS)

Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/85	1990/89
Total Chemicals & Related Products	Exports	2576	2857	2714	2613	3221	3751	4210	6050	17.4%	43.7%
	Imports	2408	3110	2882	2783	3074	3841	3934	4305	8.4%	9.4%
	Balance	168	-253	-168	-170	147	-90	276	1745		
51 Organic Chemicals	Exports	604	667	636	642	741	867	941	1123	12.0%	19.3%
	Imports	546	575	585	463	529	803	604	818	6.9%	35.4%
	Balance	58	92	51	179	212	64	337	305		
52 Inorganic Chemicals	Exports	297	312	329	345	387	484	483	460	6.9%	-4.8%
	Imports	686	1124	968	978	1065	1117	1251	1061	1.9%	-15.2%
	Balance	-389	-812	-639	-633	-678	-633	-768	-601		
53 Dyeing, Tanning and Coloring	Exports	164	179	172	156	223	227	230	421	19.6%	83.0%
	Imports	51	62	63	69	80	103	112	156	19.9%	39.3%
	Balance	113	117	109	87	143	124	118	265		
54 Medicinal and Pharmaceutical Products	Exports	174	174	181	185	212	255	266	450	20.0%	69.2%
	Imports	16	21	26	24	32	45	72	101	31.2%	40.3%
	Balance	158	153	155	161	180	210	194	349		
55 Essential Oils and Perfume Materials	Exports	118	116	103	105	140	165	215	401	31.2%	86.5%
	Imports	34	41	66	81	80	95	133	168	20.5%	26.3%
	Balance	84	75	37	24	60	70	82	233		
56 Fertilizers, Manufactured	Exports	119	200	171	106	110	115	245	188	1.9%	-23.3%
	Imports	735	831	666	569	579	715	708	751	2.4%	6.1%
	Balance	-616	-631	-495	-463	-469	-600	-463	-563		
57 Plastics in Primary Form	Exports	381	394	374	387	552	625	704	1175	25.7%	66.9%
	Imports	90	143	185	228	281	445	496	610	26.9%	23.0%
	Balance	291	251	189	159	271	180	208	565		
58 Plastics in Non-Primary Form	Exports	328	350	304	291	395	445	433	735	19.3%	69.7%
	Imports	150	197	196	226	262	347	356	403	15.5%	13.2%
	Balance	178	153	108	65	133	98	77	332		
59 Chemical Materials & Products	Exports	392	464	444	394	461	567	694	1097	19.8%	58.1%
	Imports	101	117	126	144	166	172	201	237	13.5%	17.9%
	Balance	291	347	318	250	295	395	493	860		

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.34
U.S. CHEMICALS TRADE WITH MEXICO (MILLION DOLLARS)

Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/85	1990/89
Total Chemicals & Related Products	Exports	1055	1255	1408	1261	1431	1836	2195	2298	10.3%	4.7%
	Imports	287	509	451	330	393	567	582	665	8.1%	14.3%
	Balance	768	746	957	931	1038	1269	1613	1633		
51 Organic Chemicals	Exports	420	544	604	476	523	665	680	598	-0.2%	-12.1%
	Imports	37	73	51	49	65	127	158	157	25.2%	-0.6%
	Balance	383	471	553	427	458	538	522	441		
52 Inorganic Chemicals	Exports	114	115	136	127	168	182	205	223	10.4%	8.8%
	Imports	166	173	134	124	137	193	204	236	12.0%	15.7%
	Balance	-52	-58	2	3	31	-11	1	-13		
53 Dyeing, Tanning and Coloring	Exports	38	45	46	48	58	67	69	98	16.3%	42.0%
	Imports	6	25	31	13	20	41	33	39	4.7%	18.2%
	Balance	32	20	15	35	38	26	36	59		
54 Medicinal and Pharmaceutical Products	Exports	30	38	46	47	48	57	73	105	17.9%	43.8%
	Imports	12	12	12	19	23	22	17	15	4.6%	-11.8%
	Balance	18	26	34	28	25	35	56	90		
55 Essential Oils and Perfume Materials	Exports	18	21	25	26	26	35	83	125	38.0%	50.6%
	Imports	17	18	17	22	33	37	39	44	20.9%	12.8%
	Balance	1	3	8	4	-7	-2	44	81		
56 Fertilizers, Manufactured	Exports	51	82	55	24	24	13	55	44	-4.4%	-20.0%
	Imports	8	4	1	3	6	3	10	15	71.9%	50.0%
	Balance	43	78	54	21	18	10	45	29		
57 Plastics in Primary Form	Exports	230	209	250	264	296	409	542	533	16.3%	-1.7%
	Imports	21	35	36	35	49	68	35	31	-2.9%	-11.4%
	Balance	209	174	214	229	247	341	507	502		
58 Plastics in Non-Primary Form	Exports	71	103	136	145	184	277	281	320	18.7%	13.9%
	Imports	15	23	32	45	49	57	59	76	18.9%	28.8%
	Balance	56	80	104	100	135	220	222	244		
59 Chemical Materials & Products	Exports	83	98	109	103	104	130	208	252	18.2%	21.2%
	Imports	6	145	138	19	13	17	28	52	-17.7%	85.7%
	Balance	77	-47	-29	84	91	113	180	200		

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.35
U.S. CHEMICALS TRADE WITH CHINA (MILLION DOLLARS)

Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/85	1990/89
Total Chemicals & Related Products	Exports	353	645	507	422	748	1308	1136	1054	15.8%	-7.2%
	Imports	126	151	157	174	196	230	273	337	16.5%	23.4%
	Balance	227	494	350	248	552	1078	863	717		
51 Organic Chemicals	Exports	33	98	89	81	153	280	286	245	22.4%	-14.3%
	Imports	33	42	32	43	43	51	60	71	17.3%	18.3%
	Balance	0	56	57	38	110	229	226	174		
52 Inorganic Chemicals	Exports	20	19	18	66	155	188	82	20	2.1%	-75.6%
	Imports	15	31	38	33	39	53	57	99	21.1%	73.7%
	Balance	5	-12	-20	33	116	135	25	-79		
53 Dyeing, Tanning and Coloring	Exports	1	2	5	5	5	10	14	22	34.5%	57.1%
	Imports	3	2	4	6	8	13	14	22	40.6%	57.1%
	Balance	-2	0	1	-1	-3	-3	0	0		
54 Medicinal and Pharmaceutical Products	Exports	1	1	2	3	18	6	8	14	47.6%	75.0%
	Imports	21	17	21	21	25	26	50	47	17.5%	-6.0%
	Balance	-20	-16	-19	-18	-7	-20	-42	-33		
55 Essential Oils and Perfume Materials	Exports	0	1	1	2	3	5	7	12	64.4%	71.4%
	Imports	15	15	15	16	16	24	20	23	8.9%	15.0%
	Balance	-15	-14	-14	-14	-13	-19	-13	-11		
56 Fertilizers, Manufactured	Exports	168	267	139	46	130	182	487	544	31.4%	11.7%
	Imports	0	0	0	0	1	0	2	0		
	Balance	168	267	139	46	129	182	485	544		
57 Plastics in Primary Form	Exports	92	234	226	191	239	575	197	151	-7.7%	-23.4%
	Imports	2	5	2	3	3	8	9	12	43.1%	33.3%
	Balance	90	229	224	188	236	567	188	139		
58 Plastics in Non-Primary Form	Exports	1	2	3	4	16	21	16	11	29.7%	-31.3%
	Imports	0	0	0	1	1	1	1	1		0.0%
	Balance	1	2	3	3	15	20	15	10		
59 Chemical Materials & Products	Exports	37	20	23	24	29	40	37	33	7.5%	-10.8%
	Imports	38	39	45	52	60	54	60	61	6.3%	1.7%
	Balance	-1	-19	-22	-28	-31	-14	-23	-28		

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.36
U.S. CHEMICALS TRADE WITH EASTERN EUROPE (MILLION DOLLARS)

Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/85	1990/89
Total Chemicals & Related Products	Exports	67	101	90	94	65	59	77	58	-8.4%	-24.7%
	Imports	53	117	183	163	72	103	100	80	-15.3%	-20.0%
	Balance	14	-16	-93	-69	-7	-44	-23	-22		
51 Organic Chemicals	Exports	7	9	12	15	11	13	15	12	0.0%	-20.0%
	Imports	10	21	33	33	27	26	15	12	-18.3%	-20.0%
	Balance	-3	-12	-21	-18	-16	-13	0	0		
52 Inorganic Chemicals	Exports	12	7	15	25	17	15	7	12	-4.4%	71.4%
	Imports	5	4	4	5	6	10	4	6	8.4%	50.0%
	Balance	7	3	11	20	11	5	3	6		
53 Dyeing, Tanning and Coloring	Exports	2	1	2	2	1	2	1	1	-12.9%	0.0%
	Imports	1	2	9	5	2	8	4	4	-15.0%	0.0%
	Balance	1	-1	-7	-3	-1	-6	-3	-3		
54 Medicinal and Pharmaceutical Products	Exports	5	6	8	7	6	5	8	6	-5.6%	-25.0%
	Imports	5	5	7	9	7	7	10	13	13.2%	30.0%
	Balance	0	1	1	-2	-1	-2	-2	-7		
55 Essential Oils and Perfume Materials	Exports	2	2	2	3	1	1	2	4	14.9%	100.0%
	Imports	1	1	1	1	1	1	1	1	0.0%	0.0%
	Balance	1	1	1	2	0	0	1	3		
56 Fertilizers, Manufactured	Exports	29	58	36	23	20	10	31	12	-19.7%	-61.3%
	Imports	24	75	50	61	17	29	52	22	-15.1%	-57.7%
	Balance	5	-17	-14	-38	3	-19	-21	-10		
57 Plastics in Primary Form	Exports	1	1	2	1	2	4	8	2	0.0%	-75.0%
	Imports	1	3	4	2	1	3	1	5	4.6%	400.0%
	Balance	0	-2	-2	-1	1	1	7	-3		
58 Plastics in Non-Primary Form	Exports	2	2	2	10	1	2	1	2	0.0%	100.0%
	Imports	1	1	1	1	1	1	1	1	0.0%	0.0%
	Balance	1	1	1	9	0	1	0	1		
59 Chemical Materials & Products	Exports	7	14	10	9	6	8	5	7	-6.9%	40.0%
	Imports	4	4	74	45	10	18	11	14	-28.3%	27.3%
	Balance	3	10	-64	-36	-4	-10	-6	-7		

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.37
U.S. CHEMICALS TRADE WITH THE USSR (MILLION DOLLARS)

Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/85	1990/89
Total Chemicals & Related Products	Exports	305	266	318	294	282	277	332	280	-2.5%	-15.7%
	Imports	144	207	196	163	93	116	108	163	-3.6%	50.9%
	Balance	161	59	122	131	189	161	224	117		
51 Organic Chemicals	Exports	0	4	2	9	6	10	6	4	14.9%	-33.3%
	Imports	2	12	20	19	17	15	15	10	-12.9%	-33.3%
	Balance	-2	-8	-18	-10	-11	-5	-9	-6		
52 Inorganic Chemicals	Exports	169	143	132	86	87	80	15	5	-48.0%	-66.7%
	Imports	98	142	119	84	64	77	83	151	4.9%	81.9%
	Balance	71	1	13	2	23	3	-68	-146		
53 Dyeing, Tanning and Coloring	Exports	4	3	4	4	5	3	1	4	0.0%	300.0%
	Imports	0	0	0	0	0	0	0	0	0.0%	0.0%
	Balance	4	3	4	4	5	3	1	4		
54 Medicinal and Pharmaceutical Products	Exports	1	1	1	1	1	2	13	25	90.4%	92.3%
	Imports	0	0	0	0	0	0	0	0	0.0%	0.0%
	Balance	1	1	1	1	1	2	13	25		
55 Essential Oils and Perfume Materials	Exports	0	0	0	0	0	0	4	6	0.0%	50.0%
	Imports	0	0	0	0	0	0	0	0	0.0%	0.0%
	Balance	0	0	0	0	0	0	4	6		
56 Fertilizers, Manufactured	Exports	58	47	100	126	110	107	237	201	15.0%	-15.2%
	Imports	43	54	57	60	11	24	9	1	-55.5%	-88.9%
	Balance	15	-7	43	66	99	83	228	200		
57 Plastics in Primary Form	Exports	3	4	3	2	1	1	10	13	34.1%	30.0%
	Imports	0	0	0	0	0	0	0	0	0.0%	0.0%
	Balance	3	4	3	2	1	1	10	13		
58 Plastics in Non-Primary Form	Exports	64	57	66	59	65	55	37	18	-22.9%	-51.4%
	Imports	0	0	0	0	0	0	0	0	0.0%	0.0%
	Balance	64	57	66	59	65	55	37	18		
59 Chemical Materials & Products	Exports	6	8	10	8	8	19	9	4	-16.7%	-55.6%
	Imports	1	0	0	1	0	1	0	1		
	Balance	5	8	10	7	8	18	9	3		

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.38
U.S. CHEMICALS TRADE WITH ASIAN NICs (MILLION DOLLARS)

Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/85	1990/89
Total Chemicals & Related Products	Exports	1771	1979	1737	2273	3031	4199	4733	4656	21.8%	-1.6%
	Imports	257	337	416	567	633	718	744	1024	19.7%	37.6%
	Balance	1514	1642	1321	1706	2398	3481	3989	3632		
51 Organic Chemicals	Exports	671	716	717	1011	1348	1960	2149	1884	21.3%	-12.3%
	Imports	54	70	136	212	232	267	272	430	25.9%	58.1%
	Balance	617	646	581	799	1116	1693	1877	1454		
52 Inorganic Chemicals	Exports	240	246	217	253	250	304	442	375	11.6%	-15.2%
	Imports	10	14	12	15	14	20	23	20	10.8%	-13.0%
	Balance	230	232	205	238	236	284	419	355		
53 Dyeing, Tanning and Coloring	Exports	64	68	63	89	121	141	144	203	26.4%	41.0%
	Imports	6	10	9	12	16	22	31	51	41.5%	64.5%
	Balance	58	58	54	77	105	119	113	152		
54 Medicinal and Pharmaceutical Products	Exports	69	78	84	90	105	137	140	171	15.3%	22.1%
	Imports	3	10	6	7	10	16	9	24	32.0%	166.7%
	Balance	66	68	78	83	95	121	131	147		
55 Essential Oils and Perfume Materials	Exports	64	78	69	86	93	118	157	197	23.3%	25.5%
	Imports	7	12	22	43	48	48	50	47	16.4%	-6.0%
	Balance	57	66	47	43	45	70	107	150		
56 Fertilizers, Manufactured	Exports	76	176	93	32	37	38	71	90	-0.7%	26.8%
	Imports	0	0	0	0	0	0	0	1	0.0%	
	Balance	76	176	93	32	37	38	71	89		
57 Plastics in Primary Form	Exports	333	332	256	428	698	1025	983	1022	31.9%	4.0%
	Imports	26	31	39	56	58	52	64	158	32.3%	146.9%
	Balance	307	301	217	372	640	973	919	864		
58 Plastics in Non-Primary Form	Exports	48	55	52	67	78	154	191	200	30.9%	4.7%
	Imports	140	173	171	196	228	268	276	269	9.5%	-2.5%
	Balance	-92	-118	-119	-129	-150	-114	-85	-69		
59 Chemical Materials & Products	Exports	206	229	187	216	302	322	455	515	22.5%	13.2%
	Imports	11	17	20	25	27	26	19	22	1.9%	15.8%
	Balance	195	212	167	191	255	296	436	493		

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.39
U.S. CHEMICALS TRADE WITH JAPAN (MILLION DOLLARS)

Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/85	1990/89
Total Chemicals & Related Products	Exports	2603	3000	2914	3062	3401	3982	4664	4582	9.5%	-1.8%
	Imports	1155	1408	1526	1922	2301	2399	2373	2391	9.4%	0.8%
	Balance	1448	1592	1388	1140	1100	1583	2291	2191		
51 Organic Chemicals	Exports	653	704	690	743	899	1120	1175	1124	10.3%	-4.3%
	Imports	404	480	524	681	814	859	926	843	10.0%	-9.0%
	Balance	249	224	166	62	85	261	249	281		
52 Inorganic Chemicals	Exports	632	834	820	909	872	936	1130	963	3.3%	-14.8%
	Imports	106	107	110	110	157	151	164	158	7.5%	-3.7%
	Balance	526	727	710	799	715	785	966	805		
53 Dyeing, Tanning and Coloring	Exports	51	56	62	68	76	95	93	116	13.3%	24.7%
	Imports	122	178	195	272	340	260	154	169	-2.8%	9.7%
	Balance	-71	-122	-133	-204	-264	-165	-61	-53		
54 Medicinal and Pharmaceutical Products	Exports	504	524	549	576	613	725	785	764	6.8%	-2.7%
	Imports	112	104	115	163	174	195	213	213	13.1%	0.0%
	Balance	392	420	434	413	439	530	572	551		
55 Essential Oils and Perfume Materials	Exports	58	74	71	78	125	111	163	249	28.5%	52.8%
	Imports	23	30	34	45	56	74	65	65	13.8%	0.0%
	Balance	35	44	37	33	69	37	98	184		
56 Fertilizers, Manufactured	Exports	103	156	108	48	73	79	151	160	8.2%	6.0%
	Imports	4	5	5	3	3	4	10	7	7.0%	-30.0%
	Balance	99	151	103	45	70	75	141	153		
57 Plastics in Primary Form	Exports	252	276	223	234	294	397	443	447	14.9%	0.9%
	Imports	142	179	185	190	219	219	305	315	11.2%	3.3%
	Balance	110	97	38	44	75	178	138	132		
58 Plastics in Non-Primary Form	Exports	96	103	103	112	141	162	188	195	13.6%	3.7%
	Imports	136	183	209	264	301	338	339	369	12.0%	8.8%
	Balance	-40	-80	-106	-152	-160	-176	-151	-174		
59 Chemical Materials & Products	Exports	254	273	289	293	307	358	536	564	14.3%	5.2%
	Imports	107	143	148	193	235	301	197	250	11.1%	26.9%
	Balance	147	130	141	100	72	57	339	314		

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

TABLE 3.40
U.S. CHEMICALS TRADE WITH TOTAL E.C. (MILLION DOLLARS)

Item/Year		1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/85	1990/89
Total Chemicals & Related Products	Exports	5059	5810	5911	6271	7085	8318	9758	10510	12.2%	7.7%
	Imports	4565	5870	6335	6563	7333	9066	9158	9729	9.0%	6.2%
	Balance	494	-60	-424	-292	-248	-748	600	781		
51 Organic Chemicals	Exports	1476	1629	1745	1773	2202	2619	3036	3038	11.7%	0.1%
	Imports	1843	2320	2467	2420	2779	3690	3603	3595	7.8%	-0.2%
	Balance	-367	-691	-722	-647	-577	-1071	-567	-557		
52 Inorganic Chemicals	Exports	653	984	1030	995	989	906	939	757	-6.0%	-19.4%
	Imports	734	980	1127	1039	897	1111	964	1021	-2.0%	5.9%
	Balance	-81	4	-97	-44	92	-205	-25	-264		
53 Dyeing, Tanning and Coloring	Exports	168	155	143	183	224	278	261	402	23.0%	54.0%
	Imports	351	426	442	553	640	683	615	657	8.3%	6.8%
	Balance	-183	-271	-299	-370	-416	-405	-354	-255		
54 Medicinal and Pharmaceutical Products	Exports	816	867	916	1073	1039	1320	1573	1723	13.5%	9.5%
	Imports	497	687	658	691	922	1127	1223	1461	17.3%	19.5%
	Balance	319	180	258	382	117	193	350	262		
55 Essential Oils and Perfume Materials	Exports	183	171	186	185	210	286	341	410	17.1%	20.2%
	Imports	273	399	451	515	598	718	682	778	11.5%	14.1%
	Balance	-90	-228	-265	-330	-388	-432	-341	-368		
56 Fertilizers, Manufactured	Exports	232	310	222	133	214	154	357	270	4.0%	-24.4%
	Imports	72	77	91	76	60	91	70	68	-5.7%	-2.9%
	Balance	160	233	131	57	154	63	287	202		
57 Plastics in Primary Form	Exports	588	689	691	763	861	1125 -	1397	1603	18.3%	14.7%
	Imports	217	294	344	409	429	476	640	683	14.7%	6.7%
	Balance	371	395	347	354	432	649	757	920		
58 Plastics in Non-Primary Form	Exports	307	358	338	403	446	519	616	700	15.7%	13.6%
	Imports	259	296	309	339	377	424	442	476	9.0%	7.7%
	Balance	48	62	29	64	69	95	174	224		
59 Chemical Materials & Products	Exports	637	646	641	763	899	1110	1239	1607	20.2%	29.7%
	Imports	319	392	446	520	631	746	918	990	17.3%	7.8%
	Balance	318	254	195	243	268	364	321	617		

Source: U.S. Department of Commerce
Standard International Trade Code, Revision 3

Section 4
Research and Development

The U.S. chemical industry has been one of the largest investors in research and development (R&D). New products and processes are the driving force of continued international competitiveness of the U.S. chemical industry. About 78,000 chemists, other scientists, engineers, and technicians are engaged constantly in developing new and better process technologies, new chemical compounds and products, and new applications for existing chemical products.

Prior to World War I, only three patents out of every 100 issued by the U.S. Patent Office were in the field of chemicals. In the 1980s, chemical patents accounted for about 15 percent of each year's total. This intense research is engendering dividends to the industry as well as to society as a whole. The payoff is in a rapid rate of technological innovation that is evidenced in a constant stream of new products and production processes.

There are two broad categories of research: basic and applied. Basic (or fundamental) research can be defined as any planned search for unknown facts and principles of general validity without regard to commercial objectives. Applied research on the other hand, is an investigation made for a specific practical objective. It has been defined as any planned investigation with the intent of utilizing known phenomena or substances to accomplish a particular objective. In general, the basic research of today is the foundation for tomorrow's applied research, which uses known facts to develop new processes or products.

Organized industrial research in the chemical industry did not begin until about 1900. Problems that arose during World War I gave new emphasis to research and marked the start of sizable programs. Since then, the industry's R&D effort has continued to expand, with spending reaching $12.4 billion in 1990. Today, most companies allocate 4 to 6 percent of their annual sales for R&D.

Most successful research in the chemical industry is accomplished only after intensive effort and major expenditures. Typically, it takes four to eight years from the time a project is conceived to the time a chemical product is commercialized in the marketplace. For each project that successfully leads to a practical application, many are undertaken that are unsuccessful. For each success in the marketplace, there may be as many as one hundred failures. The successes must yield enough in profits to provide an adequate return on the total investment in R&D, including the many projects that prove unsuccessful.

Spurred by international competition, chemical industry research and development spending steadily expanded in the 1980's, resulting in a larger number of patents granted.

Chart 4.1
Chemical Industry R+D Funding

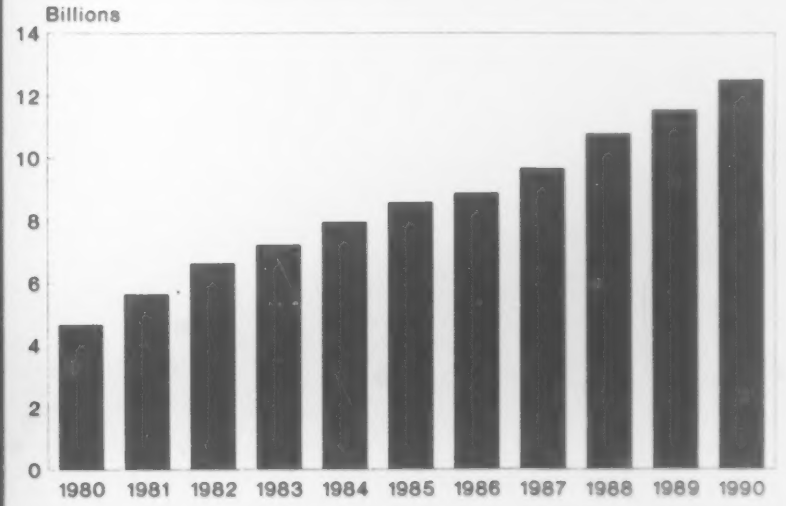
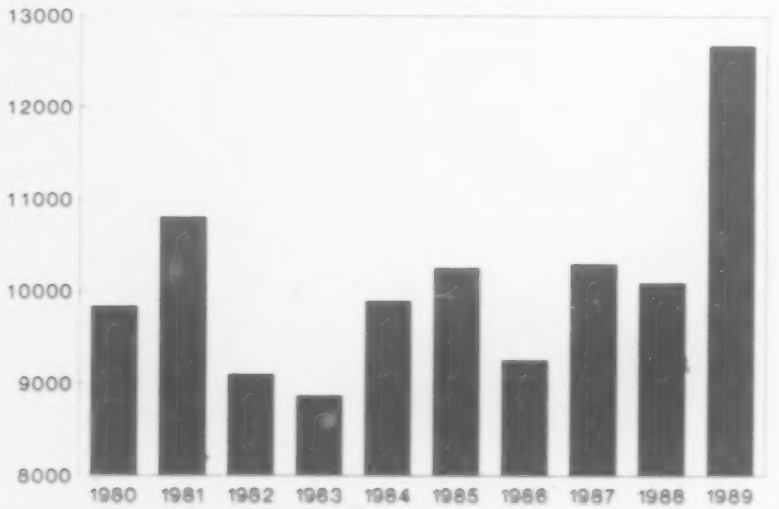


Chart 4.2
Chemicals Patent Trends



The 1990 level of spending was 2.7 times that of 1980. The chemical industry employs 12.4% of the total scientists and engineers in the manufacturing sector.

TABLE 4.1
RESEARCH & DEVELOPMENT FUNDING (MILLION DOLLARS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Manufacturing	17362	23452	42689	49904	56178	61931	69895	77525	80377	84311	89776	93326	96300	8.5%	4.4%	3.2%
Company Funds	10063	15157	29439	34380	38633	42504	48152	52642	55192	56259	60223	64676	67250	8.6%	5.0%	4.0%
Federal Contracts	7299	8295	13250	15524	17545	19427	21743	24883	25185	28052	29553	28650	29050	8.2%	3.1%	1.4%
Chemicals & Allied Products	1773	2727	4636	5625	6604	7185	7927	8540	8843	9635	10772	11537	12500	10.4%	7.9%	8.3%
Company Funds	1593	2490	4264	5205	6197	6792	7736	8310	8664	9445	10573	11449	12400	11.3%	8.3%	8.3%
Federal Contracts	180	236	372	421	407	393	191	230	179	190	199	88	100	-12.3%	-15.3%	13.6%

Source: National Science Foundation
1990 data are CMA estimates based on NSF data

TABLE 4.2
FULL-TIME EQUIVALENT R&D SCIENTISTS AND ENGINEERS (THOUSANDS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Manufacturing	n/a	n/a	449.4	476.6	498.3	531.3	553.5	580.0	609.1	605.8	612.5	622.5	632.5	3.5%	1.7%	1.6%
Chemicals & Allied Products	40.1	45.2	51.4	54.7	61.6	67.3	69.8	71.1	75.8	75.2	75.8	77.6	78.4	4.3%	2.0%	1.0%
Industrial Chemicals	21.5	21.1	20.9	21.6	25.9	26.6	25.6	23.5	24.9	22.4	22.5	23.1	23.0	1.0%	-0.4%	-0.4%
Drugs and Medicines	11.8	15.6	21.6	23.3	25.6	28.2	30.8	30.8	31.8	32.6	33.0	34.0	33.0	4.3%	1.4%	-2.9%
Other Chemicals	6.8	8.5	8.9	9.8	10.1	12.1	13.4	16.7	19.1	20.2	20.3	20.5	22.4	9.7%	6.0%	9.3%

Source: National Science Foundation
1990 data are CMA estimates based on NSF data

TABLE 4.3
U.S. PATENTS GRANTED (NUMBER)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Manufacturing	64305	71925	61807	65760	57881	56853	67183	71647	70779	82861	77792	94936	n/a
By Nation:													
United States	46982	46661	37348	39216	33891	32865	38357	39548	38082	43460	40411	49854	n/a
Japan	2618	6349	7124	8387	8149	8792	11108	12741	13196	16540	16136	20054	n/a
West Germany	4429	6030	5745	6250	5408	5423	6252	6665	6795	7816	7298	8262	n/a
United Kingdom	2949	3042	2406	2475	2134	1931	2271	2495	2408	2777	2580	3077	n/a
France	1730	2365	2088	2181	1974	1895	2162	2399	2365	2869	2655	3126	n/a
Switzerland	1108	1455	1265	1239	1147	1017	1174	1233	1208	1373	1244	1353	n/a
Other Nations	4489	6023	5831	6012	5178	4930	5859	6566	6725	8026	7468	9210	n/a
Chemical & Allied Products	8803	11867	9829	10797	9088	8856	9887	10250	9244	10295	10091	12678	n/a
By Nation:													
United States	5843	6899	5459	6001	4933	4895	5513	5515	4897	5376	5178	6379	n/a
West Germany	826	1380	1163	1323	1115	1069	1137	1171	1141	1251	1273	1569	n/a
Japan	528	1189	1105	1280	1195	1193	1323	1565	1419	1600	1630	2065	n/a
United Kingdom	369	547	517	540	424	380	480	468	390	432	473	562	n/a
France	278	472	393	426	380	350	367	432	370	427	406	528	n/a
Switzerland	348	516	347	354	319	288	295	291	252	276	282	329	n/a
Other Nations	611	864	845	873	722	681	772	808	775	933	849	1246	n/a
By Segment:													
Industrial Inorganic Chemicals	893	1226	1093	1296	1019	1107	1185	1191	1042	1160	1026	1253	n/a
Plastic Materials and Synthetics	1146	989	965	1089	925	1072	1053	1155	968	1116	1114	1373	n/a
Drugs	498	1069	1378	1430	1270	1126	1406	1407	1426	1748	1750	2352	n/a
Soaps, Cleaners, and Toilet Goods	244	355	388	461	355	393	455	473	405	463	500	695	n/a
Paints and Allied Products	388	568	457	505	405	429	461	472	360	413	396	462	n/a
Industrial Organic Chemicals	4671	6181	3863	4292	3471	3041	3421	3504	3220	3366	3259	3995	n/a
Agricultural Chemicals	399	772	1120	1097	1044	992	1170	1245	1219	1348	1373	1861	n/a
Miscellaneous Chemical Products	565	707	566	627	599	697	738	804	606	681	673	689	n/a

Source: Patent and Trademark Office

- The chemical industry received 13% of the U.S. patents granted in 1989.

U.S. companies received 50% of the chemical industry patents granted in the United States in 1989.

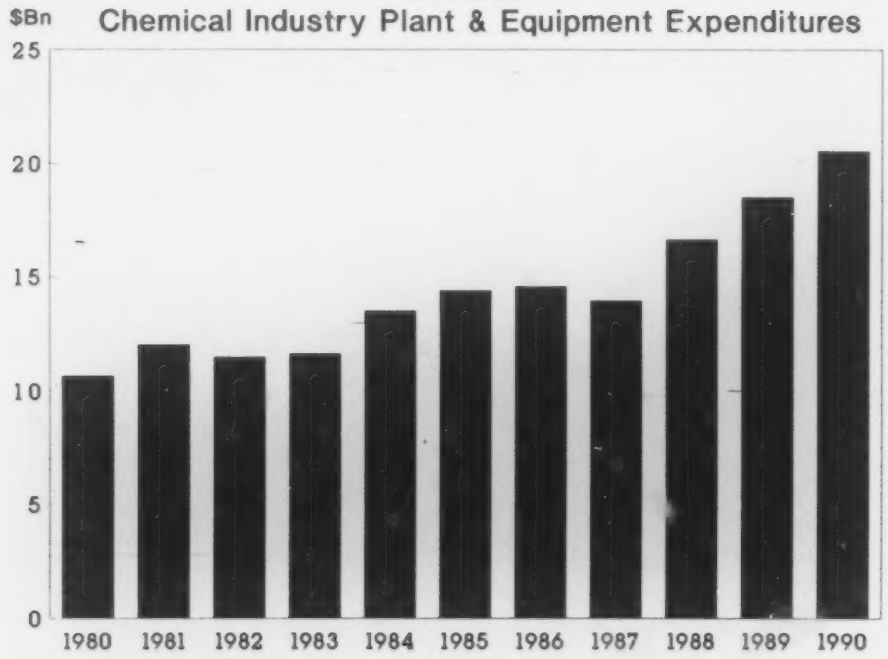
Section 5
Investment

The nature of chemical production, which lends itself to a high degree of automation, engenders prodigious capital requirements. These high capital costs reflect the large capacity needed to obtain economies of scale in the production of many chemicals, the intricate nature of the equipment and processes used, the large amounts of equipment needed, the high level of technology required, and the rapid technological obsolescence and depreciation of process plants. Indeed, the amount of capital stock per employee in the chemical industry - $125,700 in 1990 - was about twice that for U.S. manufacturing as a whole.

New capital requirements include not only extensive investment for new capacity but also for continual upgrading and replacement of existing plants to remain competitive and protect the environment. Complete modernization programs that utilize the latest process technologies, often for "debottlenecking" (i.e., maximizing throughput) are often required. A long lead time is required for funding, designing, and completing chemical industry capital spending programs. This makes short-run adjustments difficult as capital spending cannot easily be turned on and off. Given its capital intensive nature, however, the industry is highly sensitive to the costs of capital.

Following the recession of the early-1980's, chemical industry expenditures for new plant & equipment increased nearly 80 percent.

Chart 5.1



The nearly 80 percent increase in new plant and equipment expenditures between 1982 and 1990 outpaced all manufacturing by roughly 25 percent.

TABLE 5.1
NEW PLANT & EQUIPMENT EXPENDITURES (BILLION DOLLARS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Manufacturing	36.99	53.66	112.60	128.68	123.97	117.35	139.61	152.88	137.95	141.06	163.45	183.80	192.78	5.5%	4.7%	4.9%
Chemicals & Allied Products	3.38	7.12	10.62	11.99	11.44	11.59	13.46	14.35	14.54	13.92	16.62	18.47	20.54	6.8%	7.4%	11.2%

Source: Bureau of the Census (data are on a company basis)

TABLE 5.2
CAPITAL EXPENDITURES BY MAJORITY-OWNED AFFILIATES OF U.S. COMPANIES (BILLION DOLLARS)*

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Manufacturing	n/a	n/a	19.54	19.16	16.65	13.56	13.62	14.92	16.39	17.16	20.40	23.82	28.76	3.9%	14.0%	20.7%
Chemicals & Allied Products	n/a	n/a	2.97	2.97	3.35	2.32	2.39	2.74	3.06	3.74	4.71	5.29	6.91	8.8%	20.3%	30.6%

* Data series begin in 1977
Source: Bureau of Economic Analysis (data are on a company basis)

TABLE 5.3
GROSS INVESTMENT

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Gross Investment (million dollars)																
Manufacturing	23812	38487	75341	81921	77780	64425	76350	83654	76889	78809	88886	103984	105184	3.4%	4.7%	1.2%
Chemicals & Allied Products	3269	6504	9098	9708	10072	7774	8221	8799	8480	8274	9724	10716	11278	2.2%	5.1%	5.2%
Gross Investment (million 1982 dollars)																
Manufacturing	59917	65122	86847	86217	77780	63820	75086	84615	75490	74565	81395	90891	90409	0.4%	1.3%	-0.5%
Chemicals & Allied Products	8269	10670	10526	10294	10072	7651	7993	8577	7961	7406	8524	9007	9182	-1.4%	1.4%	1.9%

Source: Bureau of Economic Analysis

Reflecting higher construction costs and mandated expenditures for pollution abatement and control, the productivity of capital declined.

Chart 5.2
Capital Productivity
(1987=100)

Capital productivity, or the productivity of net fixed investment, is defined in the Statistical Handbook as capacity divided by net capital stocks and indexed where 1987=100. This measure indicates how much exisiting facilities could produce if they were fully utilized. After steadily increasing during the 1950's and 1960's, largely because of technological progress, capital productivity began to decline in the 1970's. Higher plant construction costs and mandated environmental expenditures largely account for the decline, which has slowed during the past five years.

TABLE 5.4
CHEMICAL INDUSTRY GROSS INVESTMENT BY TYPE (MILLION 1982 DOLLARS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Total Gross Investment	8269	10670	10526	10294	10072	7651	7993	8577	7961	7406	8524	9007	9182	-1.4%	1.4%	1.9%
Producers Durable Equipment:	6118	8868	8429	8653	8320	6228	6574	7050	6604	6210	7161	7469	7420	-1.3%	1.0%	-0.7%
Traditional Process Equipment	5460	6076	5003	5151	4781	3816	3738	3575	3500	3252	4084	4396	4252	-1.6%	3.5%	-3.3%
Information Processing Equipment	524	2550	3206	3280	3306	2183	2593	3155	2845	2702	2824	2848	2992	-0.7%	-1.1%	5.1%
Other Equipment	134	242	220	222	233	229	243	320	259	256	253	225	176	-2.2%	-11.3%	-21.8%
Buildings and Structures	2151	1802	2097	1641	1752	1423	1419	1527	1357	1196	1363	1538	1762	-1.7%	2.9%	14.6%

Source: Bureau of Economic Analysis

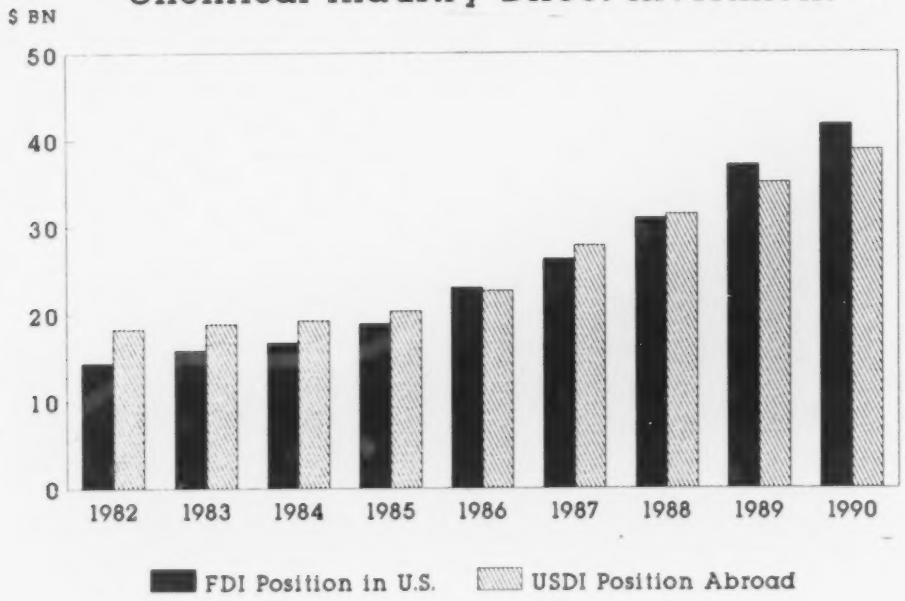
TABLE 5.5
CAPITAL STOCKS AND PRODUCTIVITY

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Gross Capital Stocks (billion dollars)																
Manufacturing	254.91	368.19	602.34	669.93	732.12	778.68	835.27	896.67	948.76	999.88	1058.15	1128.85	1198.25	7.1%	6.0%	6.1%
Chemicals & Allied Products	31.85	47.90	81.18	88.82	96.44	101.33	106.35	111.55	116.05	119.96	124.93	130.54	136.45	5.3%	4.1%	4.5%
Net Capital Stocks (billion dollars)																
Manufacturing	164.83	236.21	397.86	444.06	482.73	504.39	535.54	570.38	595.09	619.10	650.57	693.93	735.32	6.3%	5.2%	6.0%
Chemicals & Allied Products	20.56	31.19	53.04	57.56	61.93	63.62	65.56	67.79	69.42	70.66	73.15	76.38	79.94	4.2%	3.4%	4.7%
Gross Capital Stocks (billion 1982 dollars)																
Manufacturing	856.81	1023.85	1236.40	1282.02	1315.90	1333.42	1360.20	1393.48	1415.06	1432.71	1454.26	1483.12	1509.19	2.0%	1.6%	1.8%
Chemicals & Allied Products	102.97	126.80	158.63	163.40	167.28	168.06	168.93	169.96	169.97	169.19	169.07	169.27	169.57	0.7%	0.0%	0.2%
Net Capital Stocks (billion 1982 dollars)																
Manufacturing	513.28	597.21	707.21	729.71	741.33	737.48	744.16	758.00	760.47	760.65	766.39	780.04	791.75	1.1%	0.9%	1.5%
Chemicals & Allied Products	62.56	75.27	91.16	62.55	93.37	91.63	90.34	89.59	88.20	86.42	85.73	85.56	85.64	-0.6%	-0.9%	0.1%
Capacity (1982=100)																
Manufacturing	67.4	79.5	93.3	96.9	100.0	102.6	105.6	109.5	113.4	116.7	119.9	123.2	126.9	3.1%	3.0%	3.0%
Chemicals & Allied Products	62.3	81.5	96.9	98.8	100.0	100.5	101.6	102.9	103.9	105.8	108.8	112.8	117.3	1.9%	2.7%	4.0%
Average Age of Gross Capital Stocks (years)																
Manufacturing	9.71	10.01	10.15	10.19	10.31	10.53	10.67	10.74	10.88	11.04	11.13	11.17	11.21	1.0%	0.9%	0.4%
Chemicals & Allied Products	8.90	9.12	9.29	9.44	9.60	9.89	10.17	10.39	10.64	10.91	11.09	11.23	11.36	2.0%	1.8%	1.2%
Average Age of Net Capital Stocks (years)																
Manufacturing	6.61	7.02	7.08	7.10	7.21	7.45	7.55	7.57	7.69	7.81	7.85	7.80	7.77	0.9%	0.5%	-0.4%
Chemicals & Allied Products	6.04	6.37	6.58	6.72	6.87	7.18	7.43	7.60	7.81	8.02	8.12	8.15	8.16	2.2%	1.4%	0.1%
Capital Productivity (1987=100) *																
Manufacturing	216.9	178.5	124.5	115.7	109.9	107.9	104.6	101.9	101.1	100.0	97.7	94.2	91.5	-3.0%	-2.1%	-2.9%
Chemicals & Allied Products	202.4	174.6	122.0	114.7	107.9	105.6	103.6	101.4	100.0	100.0	99.5	98.7	98.1	-2.2%	-0.7%	-0.6%

Source: Bureau of Economic Analysis, Federal Reserve Board, CMA analysis
* Capital productivity (or the productivity of net fixed investment) is defined as capacity divided by net capital stocks in current dollars and indexed where 1987=100.

Since the early-1980's, the U.S. chemical industry has become more global in scope.

Chart 5.3
Chemical Industry Direct Investment



Foreign investment in the U.S. chemical industry more than doubled between 1985 and 1990. Europeans were the dominant investors in U.S. chemicals. U.S. chemical industry investments abroad also grew substantially, around 58 percent of new U.S. chemical industry investment abroad went to Europe.

TABLE 5.6
INTERNATIONAL DIRECT INVESTMENT (BILLION DOLLARS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Foreign Direct Investment Position in the United States (billion dollars) *																
Manufacturing	n/a	n/a	n/a	n/a	44.07	47.67	51.80	59.58	71.96	93.87	122.58	151.82	160.00		21.8%	5.4%
Chemicals & Allied Products	n/a	n/a	n/a	n/a	14.38	15.78	16.63	18.84	22.95	26.29	30.93	37.00	41.68		17.2%	12.7%
Foreign Direct Investment in the United States: Capital Inflows (billion dollars) *																
Manufacturing	n/a	n/a	n/a	n/a	2.74	3.54	3.99	8.05	11.87	24.78	33.14	37.97	11.61		7.6%	-69.4%
Chemicals & Allied Products	n/a	n/a	n/a	n/a	0.68	1.39	0.83	1.95	4.11	7.16	5.71	11.97	6.12		25.8%	-48.9%
Foreign Direct Investment in the United States: Income (billion dollars) *																
Manufacturing	n/a	n/a	n/a	n/a	0.04	0.82	2.44	0.20	0.08	4.58	7.42	6.59	4.27		84.5%	-35.2%
Chemicals & Allied Products	n/a	n/a	n/a	n/a	0.25	0.52	0.82	0.49	0.52	2.03	2.80	2.76	3.44		47.8%	24.7%
Foreign Direct Investment in the United States: Royalties and License Fees (billion dollars) *																
Manufacturing	n/a	n/a	n/a	n/a	0.16	0.20	0.28	0.26	0.32	0.66	0.70	0.95	1.19		35.3%	24.7%
Chemicals & Allied Products	n/a	n/a	n/a	n/a	0.11	0.10	0.14	0.16	0.20	0.36	0.43	0.59	0.67		33.8%	14.0%
Foreign Direct Investment in the United States: Charges for Other Services (billion dollars) *																
Manufacturing	n/a	n/a	n/a	n/a	0.12	0.04	0.23	0.35	-0.06	0.36	0.29	0.32	0.28		-4.7%	-14.6%
Chemicals & Allied Products	n/a	n/a	n/a	n/a	0.05	-0.06	-0.06	-0.01	0.03	0.04	0.04	-0.05	0.07			
U.S. Direct Investment Position Abroad (billion dollars) *																
Manufacturing	n/a	n/a	n/a	n/a	83.45	82.91	85.87	94.70	105.10	131.65	138.73	149.24	168.22		12.2%	12.7%
Chemcials & Allied Products	n/a	n/a	n/a	n/a	18.27	18.79	19.20	20.27	22.65	27.79	31.37	35.00	38.75		13.8%	10.7%
U.S. Direct Investment Abroad: Capital Outflows (billion dollars) *																
Manufacturing	n/a	n/a	n/a	n/a	4.06	2.86	6.73	5.57	5.86	13.29	7.54	12.81	10.16		12.8%	-20.7%
Chemicals & Allied Products	n/a	n/a	n/a	n/a	0.79	0.78	1.30	0.62	1.60	3.18	3.80	4.61	2.12		28.0%	-54.1%
U.S. Direct Investment Abroad: Income (billion dollars) *																
Manufacturing	n/a	n/a	n/a	n/a	6.42	8.22	10.71	11.21	13.83	19.23	25.43	25.68	22.88		15.3%	-10.9%
Chemicals & Allied Products	n/a	n/a	n/a	n/a	1.38	1.78	2.26	2.15	3.57	4.44	6.19	5.90	5.44		20.3%	-7.8%
U.S. Direct Investment Abroad: Royalties and License Fees (billion dollars) *																
Manufacturing	n/a	n/a	n/a	n/a	2.74	2.83	3.05	3.18	4.09	5.44	6.44	6.89	8.58		21.9%	24.5%
Chemicals & Allied Products	n/a	n/a	n/a	n/a	0.63	0.63	0.68	0.67	0.77	0.97	1.33	1.40	1.77		21.5%	26.3%
U.S. Direct Investment Abroad: Charges for Other Services (billion dollars) *																
Manufacturing	n/a	n/a	n/a	n/a	1.05	1.12	1.18	1.23	1.36	1.12	1.22	2.16	1.95		9.7%	-9.9%
Chemicals & Allied Products	n/a	n/a	n/a	n/a	0.26	0.31	0.28	0.31	0.31	0.32	0.39	0.51	0.58		13.8%	13.6%

* Data series begin in 1982
Source: Bureau of Economic Analysis

Section 6
Employment and Labor

The chemical industry is one of the most intensive consumers of capital and energy and one of the least intensive users of labor. Capital stocks per employee in the chemical industry — $125,700 in 1990 — are among the highest in American manufacturing (which averaged $62,900 per employee in 1990). Employing 1,085,500 workers in 1990, the chemical industry, nonetheless, is one of the largest U.S. industries in terms of employment. Since World War II, growth in the chemical industry has been accompanied by expanding employment and significant gains in labor productivity (i.e., output per manhour).

Because of the highly varied and technical nature of its operations and products, the role of research and development (R&D) and technical servicing provided to customers is critical. This, together with continuing increased automation of production processes, has caused the production worker's portion of the industry workforce to decline modestly over the years. Production worker employment was 599,400 in 1990, 55 percent of the total (as compared with 68 percent for manufacturing as a whole).

Thus, four out of every ten employees in chemicals are in administration, sales, technical servicing, R&D, and clerical positions. The industry employs some 78,400 scientists and engineers in R&D alone. This represents about 7 percent of total chemical industry employment and over 12 percent of total R&D employment of scientists and engineers by the manufacturing sector in the United States.

The increasingly complex nature of the chemical industry requires new and more highly developed skills, and better trained and educated workers. In plant operations, this has resulted in making technicians out of skilled workers and skilled workers out of unskilled workers. In other areas, the need for chemists, chemical engineers, and other technically trained personnel (from agronomists to toxicologists to zoologists) continues to mount. The need for more technical production line skills and the increasing productivity of chemical industry workers has resulted in the chemical industry paying hourly production wages that are 25 percent to 30 percent greater than those paid in manufacturing as a whole.

After a long period of restructuring, employment in the U.S. chemical industry increased steadily after 1986.

Chart 6.1

Chemical Industry Employment

Chemical industry employment rose 6.2 percent between 1986 and 1990 to 1.1 million. Pharmaceuticals added 31,300 jobs during this period. Plastic materials and synthetics added 17,400 and soap, cleaners, and toilet goods, increased employment by 11,800.

TABLE 6.1
EMPLOYMENT (THOUSANDS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Manufacturing	19366.1	18323.2	20285.3	20170.1	18780.7	18433.8	19378.3	19259.8	18964.5	19024.3	19349.9	19426.3	19062.0	-0.6%	-0.2%	-1.9%
Chemicals & Allied Products	1049.3	1014.7	1107.4	1109.0	1075.1	1042.8	1049.4	1044.1	1021.8	1025.9	1059.0	1073.8	1085.5	-0.2%	0.8%	1.1%
Industrial Inorganic Chemicals	n/a	148.9	161.3	162.1	161.0	150.8	143.0	142.5	135.4	130.6	132.6	132.8	134.8	-1.8%	-1.1%	1.6%
Plastics Materials and Synthetics	232.5	218.4	204.8	196.0	184.7	176.5	177.8	172.1	167.6	168.2	177.0	183.6	185.0	-1.0%	1.5%	0.8%
Drugs	148.9	166.6	196.1	199.0	198.8	201.3	205.9	205.7	207.6	215.2	227.8	232.6	238.9	2.0%	3.0%	2.7%
Soap, Cleaners, and Toilet Goods	127.0	121.5	140.9	146.0	143.9	142.2	145.5	147.7	146.7	152.7	159.7	160.0	158.5	1.2%	1.4%	-0.9%
Paints and Allied Products	69.9	62.3	65.1	63.4	59.9	59.7	62.0	63.5	62.9	62.6	63.3	62.8	62.9	-0.3%	-0.2%	0.1%
Industrial Organic Chemicals	n/a	149.3	173.9	177.6	170.6	162.9	162.2	159.9	154.2	148.1	146.0	149.6	152.6	-1.3%	-0.9%	2.0%
Agricultural Chemicals	n/a	65.3	72.0	70.4	65.3	60.5	60.6	58.8	54.0	51.4	51.9	52.8	53.0	-3.0%	-2.0%	0.5%
Miscellaneous Chemical Products	n/a	82.4	93.3	94.4	91.0	89.0	92.3	94.2	93.6	96.9	100.6	99.8	99.6	0.7%	1.1%	-0.1%

Source: Bureau of Labor Statistics

TABLE 6.2
EMPLOYMENT-PRODUCTION WORKERS (THOUSANDS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Manufacturing	14044.5	13042.6	14214.2	14020.3	12741.8	12529.6	13284.5	13092.3	12876.6	12969.8	13220.8	13256.8	12935.8	-0.9%	-0.2%	-2.4%
Chemicals & Allied Products	604.0	579.6	625.8	628.3	598.6	578.6	583.0	577.8	568.0	575.3	597.0	603.4	599.4	-0.4%	0.7%	-0.7%
Industrial Inorganic Chemicals	n/a	89.9	87.5	88.4	85.7	77.0	72.8	72.2	69.3	67.2	68.5	68.9	68.2	-2.5%	-1.1%	-0.9%
Plastics Materials and Synthetics	142.9	136.4	136.6	129.7	119.3	114.6	117.3	114.4	112.7	110.9	115.8	119.7	118.7	-1.4%	0.7%	-0.8%
Drugs	72.6	83.7	96.7	99.4	98.2	98.2	96.2	94.8	96.0	98.7	101.0	102.3	106.4	1.0%	2.3%	4.0%
Soap, Cleaners, and Toilet Goods	72.9	72.7	85.8	91.6	90.2	89.1	92.6	93.5	92.8	97.5	102.7	101.0	97.8	1.3%	0.9%	-3.2%
Paints and Allied Products	39.1	32.9	32.9	31.3	28.9	29.2	30.4	30.6	30.3	30.7	31.3	31.8	31.8	-0.3%	0.8%	0.1%
Industrial Organic Chemicals	n/a	74.4	88.1	89.6	85.8	83.6	82.4	81.5	81.2	83.1	86.3	87.4	84.8	-0.4%	0.8%	-3.1%
Agricultural Chemicals	n/a	42.2	45.4	44.0	39.6	36.5	37.5	36.6	33.1	32.3	33.2	33.1	32.8	-3.2%	-2.2%	-1.0%
Miscellaneous Chemical Products	n/a	47.4	52.8	54.3	50.9	50.5	53.7	54.2	52.6	54.9	58.2	59.3	58.9	1.1%	1.7%	-0.7%

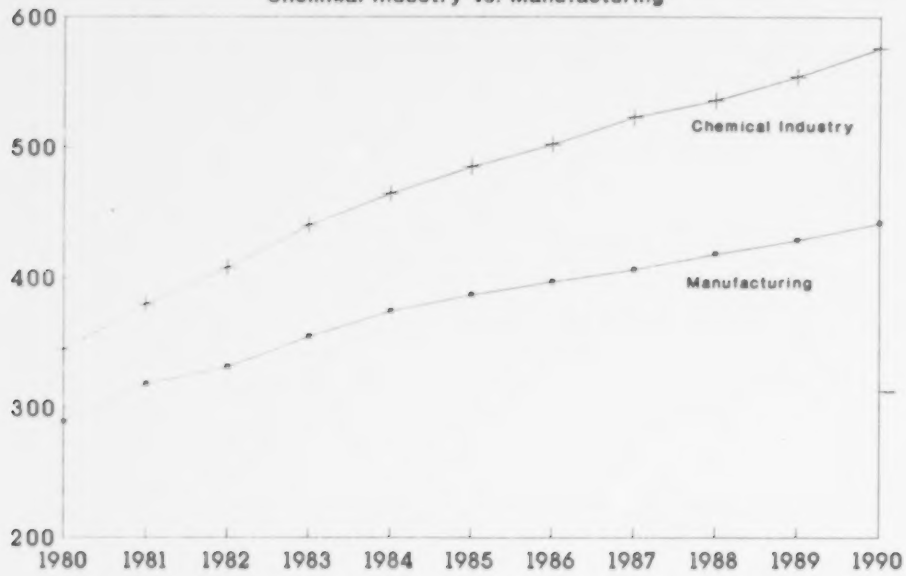
Source: Bureau of Labor Statistics

Weekly earnings in the chemical industry are consistently above those in Manufacturing as a whole.

Chart 6.2

Weekly Earnings

Chemical Industry vs. Manufacturing



Average weekly earnings for chemical production workers increased by an average of 4.8 percent per year between 1982 and 1990. Manufacturing workers weekly pay increased by an average of 3.7 percent per year. During the same period consumer prices increased by an average of 4.1 percent per year.

TABLE 6.3
AVERAGE HOURLY EARNINGS-PRODUCTION WORKERS ($/HOUR)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Manufacturing	3.35	4.83	7.28	7.99	8.50	8.83	9.19	9.54	9.73	9.91	10.19	10.49	10.84	4.1%	2.6%	3.3%
Chemicals & Allied Products	3.69	5.39	8.31	9.12	9.97	10.58	11.07	11.57	11.98	12.37	12.71	13.09	13.53	5.0%	3.2%	3.4%
Industrial Inorganic Chemicals	n/a	5.73	9.08	10.16	11.02	11.66	12.30	12.80	13.11	13.56	13.83	14.19	14.67	4.9%	2.8%	3.4%
Plastics Materials and Synthetics	3.62	5.27	8.21	9.01	9.88	10.55	11.10	11.72	12.13	12.60	13.06	13.44	14.02	5.5%	3.7%	4.3%
Drugs	3.54	5.18	7.69	8.29	9.08	9.71	10.23	10.75	11.15	11.62	12.07	12.51	12.87	5.3%	3.7%	2.9%
Soap, Cleaners, and Toilet Goods	3.64	5.15	7.67	8.38	9.12	9.64	9.90	10.28	10.76	10.90	11.05	11.28	11.76	4.4%	2.7%	4.3%
Paints and Allied Products	3.47	5.00	7.39	8.03	8.80	9.33	9.75	10.08	10.44	10.84	11.24	11.66	12.01	5.0%	3.6%	3.0%
Industrial Organic Chemicals	n/a	6.25	6.25	6.88	4.93	12.73	13.43	13.98	14.39	14.89	15.30	15.65	15.97	9.8%	2.7%	2.0%
Agricultural Chemicals	n/a	4.94	8.13	8.91	9.71	10.25	10.74	11.05	11.45	11.92	12.36	12.80	13.59	5.3%	4.2%	6.2%
Miscellaneous Chemical Products	n/a	5.11	7.75	8.44	9.22	9.62	10.09	10.61	11.07	11.36	11.53	11.92	12.30	4.7%	3.0%	3.2%

Source: Bureau of Labor Statistics

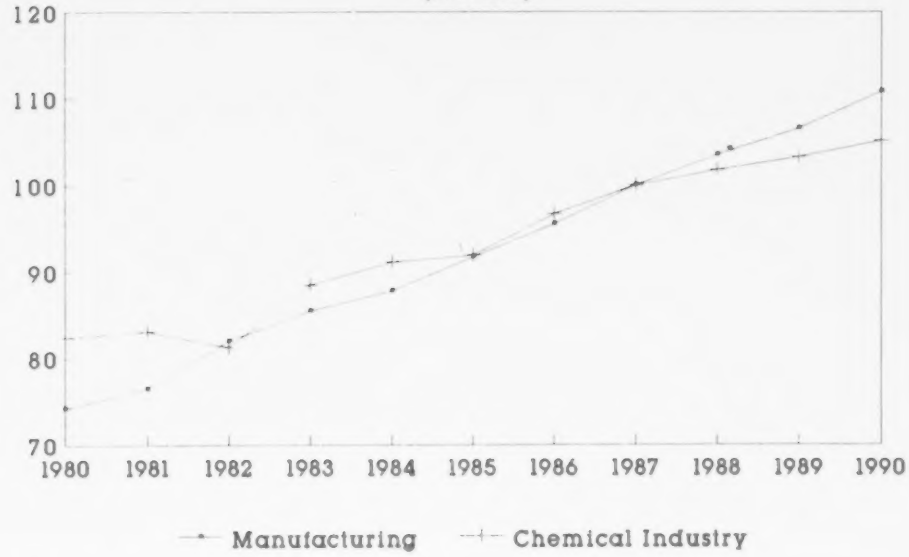
TABLE 6.4
AVERAGE WEEKLY EARNINGS-PRODUCTION WORKERS ($/WEEK)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Manufacturing	133.54	190.49	288.88	318.10	330.83	354.05	373.80	386.48	396.56	406.08	418.61	429.79	441.82	4.3%	2.7%	2.8%
Chemicals & Allied Products	153.52	220.79	344.43	379.24	407.50	439.96	464.07	484.62	502.17	523.18	537.09	555.26	576.05	5.3%	3.5%	3.7%
Industrial Inorganic Chemicals	n/a	237.32	376.59	422.14	445.67	484.04	518.16	533.38	551.26	574.88	590.55	606.23	629.71	5.3%	3.4%	3.9%
Plastics Materials and Synthetics	151.37	213.99	339.69	378.57	401.48	442.87	468.63	495.47	511.46	542.63	567.09	579.67	595.97	5.8%	3.8%	2.8%
Drugs	143.54	212.62	315.50	340.51	373.14	398.78	416.13	441.38	463.69	483.41	496.50	521.46	537.84	5.5%	4.0%	3.1%
Soap, Cleaners, and Toilet Goods	149.50	208.72	310.28	338.77	370.57	396.40	408.91	421.78	441.76	447.99	444.29	452.87	479.55	4.4%	2.6%	5.9%
Paints and Allied Products	140.83	202.32	297.80	324.36	348.13	382.27	406.57	417.53	433.73	451.58	471.53	487.71	503.06	5.4%	3.8%	3.1%
Industrial Organic Chemicals	n/a	258.35	413.86	458.65	496.62	540.45	578.14	605.93	624.45	655.97	670.27	697.89	721.17	5.7%	3.5%	3.3%
Agricultural Chemicals	n/a	209.75	352.61	382.90	407.86	431.26	459.28	471.90	482.67	510.67	535.76	555.55	598.87	5.4%	4.9%	7.8%
Miscellaneous Chemical Products	n/a	206.85	317.78	348.54	373.45	397.33	421.57	443.80	457.77	470.82	485.30	505.24	521.89	5.1%	3.3%	3.3%

Source: Bureau of Labor Statistics

Labor productivity in the U.S. chemical industry has improved significantly since 1980.

Chart 6.3
Labor Productivity
(1987=100)



Labor productivity in the chemical industry rose by an average of 2.5 percent per year from 1980 to 1990, slightly below the 4.1 manufacturing average.

TABLE 6.5
AVERAGE WEEKLY HOURS-PRODUCTION WORKERS (HOURS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Manufacturing	39.8	39.5	39.7	39.8	38.9	40.1	40.7	40.5	40.7	41.0	41.1	41.0	40.8	0.3%	0.1%	-0.5%
Chemicals & Allied Products	41.6	41.0	41.5	41.6	40.9	41.6	41.9	41.9	41.9	42.3	42.3	42.4	42.6	0.3%	0.3%	0.3%
Industrial Inorganic Chemicals	n/a	41.4	41.5	41.6	40.4	41.5	42.1	41.7	42.0	42.4	42.7	42.7	42.9	0.3%	0.6%	0.5%
Plastics Materials and Synthetics	41.8	40.6	41.4	42.0	40.6	42.0	42.2	42.3	42.2	43.1	43.4	43.1	42.5	0.3%	0.1%	-1.5%
Drugs	40.5	41.0	41.0	41.1	41.1	41.1	40.7	41.0	41.6	41.6	41.1	41.7	41.8	0.2%	0.4%	0.2%
Soap, Cleaners, and Toilet Goods	41.0	40.6	40.5	40.4	40.6	41.1	41.3	41.0	41.1	41.1	40.2	40.1	40.8	0.1%	-0.1%	1.6%
Paints and Allied Products	40.5	40.4	40.3	40.4	39.6	41.0	41.7	41.4	41.6	41.7	41.9	41.8	41.9	0.4%	0.2%	0.2%
Industrial Organic Chemicals	n/a	41.4	42.8	42.8	41.9	42.5	43.1	43.3	43.4	44.1	43.8	44.6	45.2	0.5%	0.8%	1.3%
Agricultural Chemicals	n/a	42.5	43.4	43.0	42.0	42.1	42.8	42.7	42.2	42.8	43.3	43.4	44.1	0.2%	0.6%	1.5%
Miscellaneous Chemical Products	n/a	40.5	41.0	41.3	40.5	41.3	41.8	41.8	41.3	41.5	42.1	42.4	42.4	0.3%	0.3%	0.1%

Source: Bureau of Labor Statistics

TABLE 6.6
LABOR PRODUCTIVITY INDEX (1987=100)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Manufacturing	53.6	63.1	74.2	76.5	82.0	85.5	87.8	91.7	95.5	100.0	103.5	106.5	110.8	4.1%	3.9%	4.0%
Chemicals & Allied Products	54.2	70.8	82.4	83.1	81.3	88.5	91.1	91.9	96.7	100.0	101.7	103.2	105.1	2.5%	2.7%	1.8%
Industrial Inorganic Chemicals	n/a	65.1	75.8	75.2	71.2	82.2	90.0	91.1	93.1	100.0	95.7	103.3	105.8	3.4%	3.0%	2.4%
Plastics Materials and Synthetics	31.5	47.3	60.2	69.7	70.7	83.7	85.7	85.8	92.1	100.0	99.2	95.4	100.8	5.3%	3.3%	5.7%
Drugs	64.1	74.6	83.0	81.3	84.1	87.6	91.2	93.4	99.4	100.0	105.9	104.1	105.1	2.4%	2.4%	1.0%
Soap, Cleaners, and Toilet Goods	91.1	107.7	119.4	105.7	97.5	99.9	94.8	95.3	101.6	100.0	104.6	109.7	112.7	-0.6%	3.4%	2.7%
Paints and Allied Products	65.8	84.5	84.1	85.1	88.1	90.7	92.7	96.6	99.2	100.0	101.3	101.2	95.7	1.3%	-0.2%	-5.4%
Industrial Organic Chemicals	n/a	83.2	90.1	92.6	82.5	92.8	96.4	97.6	98.8	100.0	99.8	102.6	102.5	1.3%	1.0%	-0.1%
Agricultural Chemicals	n/a	62.4	68.3	74.8	73.8	78.8	87.9	85.0	87.6	100.0	103.0	104.3	100.0	3.9%	3.3%	-4.1%

Source: Bureau of Labor Statistics, Federal Reserve Board, CMA analysis

TABLE 6.7
UNIT LABOR COSTS (1987=100)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Manufacturing	63.1	77.2	98.9	105.5	104.5	104.1	105.6	104.9	102.8	100.0	99.3	99.4	98.8	0.0%	-1.2%	-0.6%
Chemicals & Allied Products	55.1	61.6	81.6	88.8	99.1	96.6	98.3	101.8	100.2	100.0	101.1	102.6	104.1	2.5%	0.4%	1.5%
Industrial Inorganic Chemicals	n/a	64.9	88.3	99.6	114.2	104.7	100.8	103.6	103.9	100.0	106.5	101.3	102.3	1.5%	-0.3%	1.0%
Plastics Materials and Synthetics	91.1	88.5	108.3	102.6	110.8	100.0	102.8	108.4	104.5	100.0	104.5	111.8	110.4	0.2%	0.4%	-1.3%
Drugs	47.6	59.8	79.7	87.8	92.9	95.4	96.6	99.1	96.6	100.0	98.1	103.4	105.4	2.8%	1.2%	1.9%
Soap, Cleaners, and Toilet Goods	36.7	43.8	58.9	72.7	85.8	88.5	95.7	98.9	97.1	100.0	96.9	94.3	95.6	5.0%	-0.7%	1.4%
Paints and Allied Products	48.8	54.7	81.1	87.0	92.1	94.9	97.1	96.3	97.0	100.0	102.3	106.4	115.8	3.6%	3.8%	8.8%
Industrial Organic Chemicals	n/a	50.5	72.1	77.7	96.5	92.1	93.6	96.2	97.8	100.0	102.9	102.5	104.6	3.8%	1.7%	2.0%
Agricultural Chemicals	n/a	66.4	99.8	99.9	110.4	109.2	102.4	109.0	109.6	100.0	100.7	102.9	113.0	1.2%	0.7%	9.8%

Source: Bureau of Labor Statistics, Federal Reserve Board, CMA analysis

Section 7
Health, Safety, and Environmental

The U.S. Chemical industry is subject to a wide variety of statutes and regulations designed to protect and improve the nation's health, safety and environment. These statutes and regulations very much affect the industry's products, processes, and production costs. The major laws are:

The Toxic Substances Control Act (TSCA) gives the Environmental Protection Agency (EPA) the authority to regulate toxic substances. Among other requirements, it mandates that chemical companies submit premanufacture notices that provide information on health and environmental effects for each new product and test existing products for these effects.

The Clean Air Act provides EPA authority to regulate air pollutants from automobiles, electric power plants, chemical plants and other industrial sources.

The Superfund Amendments and Reauthorization Act (SARA) of 1986 established "right to know" standards that require petroleum refineries, chemical plants, and other industrial facilities to provide information to the public about stored toxic substances and annual releases into the environment. Superfund also established a fund for cleaning up waste sites with revenue from a broad-based tax on the oil, chemical, and other industries.

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) provides EPA authority to register and assess risk on agricultural pesticides industrial biocides, and other non-agricultural pesticides.

The Food, Drug and Cosmetics Act provides the Food and Drug Administration (FDA) authority to regulate the manufacturing of drugs and pharmaceuticals and the use of packaging and additives in food and cosmetics.

The Resource Conservation and Recovery Act (RCRA) provides EPA with authority to establish standards and regulations for handling and disposing of solid and hazardous wastes. The act also requires companies to establish programs to reduce the volume and toxicity of hazardous wastes.

Other acts that impact the chemical industry include: (1) the Occupational Safety and Health Act, which sets workplace safety and health standards, including permissable exposures to chemicals in the workplace; (2) the Clean Water Act, which provides EPA the authority to regulate effluents into waters; (3) the Safe Water Drinking Act, which provides EPA with authority to set standards protecting ground water quality around public wells; (4) the Hazardous Materials Transportation Act (HMTA), which provides the Department of Transportation the authority to regulate the movement of hazardous materials; and (5) the Chemical Diversion and Trafficking Act (CDTA), which is designed to prevent the diversion of chemicals to illegal drug producers.

In addition to these Federal statutes, there are also international agreements and state laws that significantly affect the chemical industry. These include, for example, the Protocol to Limit Emissions of Chlorofluorocarbons, signed in 1987 in Montreal, Canada, to limit chlorofluorocarbon production. State governments are also increasingly active in the environmental and safety areas. In addition to the state implementation role in many federal programs, the states themselves are active in a range of issues that impact the chemical industry. These include hazardous waste, toxics use reduction, chemical specific taxes and fees, and state right-to-know statutes.

During the past two decades, the U.S. chemical industry has conducted an extensive program to reduce the emissions of the many types of materials that contribute to air, water, and land pollution. The industry's environmental actions have necessitated capital expenditures for pollution abatement and control that have totalled nearly $14 billion since 1973. In 1990, capital expenditures for pollution abatement and control were an estimated $1.7 billion, about 15 percent of chemical industry fixed capital investment. Surveys indicate that this is expected to increase in 1991. With passage of an amendment to the Clean Air Act, as much as 25 to 30 percent of the industry's fixed capital investment may be allocated to pollution abatement and control. The chemical industry's capital expenditures for pollution abatement and control are about 38 percent of those by all manufacturing industries.

The period since the early-1970s has also witnessed increasing gross annual operating costs (depreciation, labor, material and supplies, services, etc.) for pollution abatement and control. Estimated at $3.8 billion in 1990, these operating costs represent about 1.3 percent of the industry's value of shipments. In 1989, the chemical industry accounted for 22 percent of all manufacturing gross annual costs for pollution abatement and control.

The U.S. chemical industry has also achieved a remarkable record of safety, much better than manufacturing as a whole and other sectors of the economy. This record has continually improved during the post-World War II period, largely as a result of elimination of job hazards and the industry's initiatives in implementing effective safety programs.

Pollution abatement costs of U.S. industry - both capital expenditures and operating costs for pollution control - are rising rapidly.

Chart 7.1
Chemical Industry Pollution Abatement

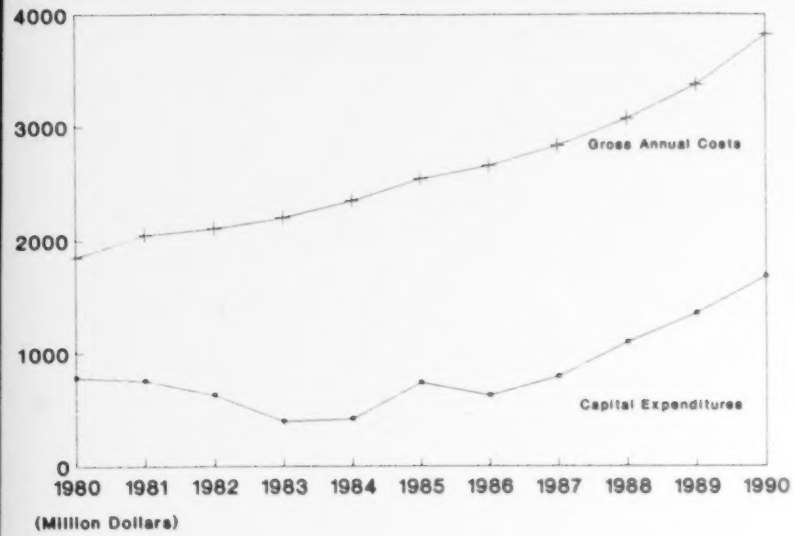
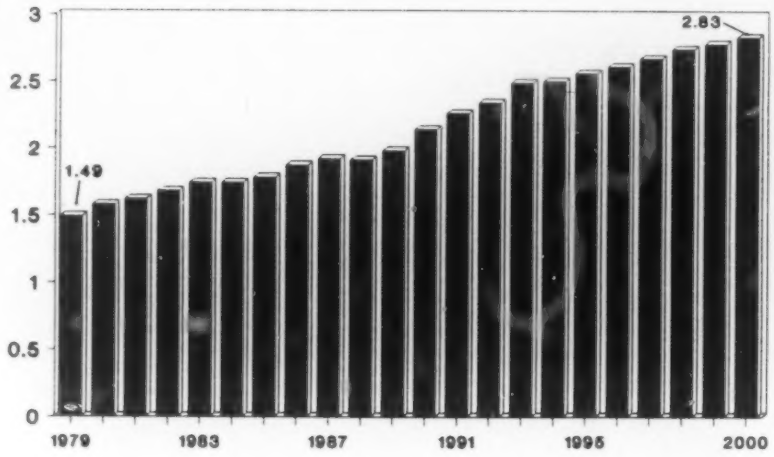


Chart 7.2
Total Annualized Costs as a Percentage of GNP



U.S. Pollution abatement control spending reached $105 billion in 1990, about 1.9 percent of GNP. According to EPA estimates, based on programs existing before enactment of amendments to the Clean Air Act, U.S. spending will rise to about 2.83 percent of GNP by the year 2000.

TABLE 7.1
U.S. SPENDING FOR POLLUTION ABATEMENT AND CONTROL (BILLION DOLLARS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Gross National Product	1015.5	1598.4	2732.0	3052.6	3166.0	3405.7	3772.2	4014.9	4231.6	4515.6	4873.7	5200.8	5465.1	7.2%	6.4%	5.1%
% PAC		1.89%	1.96%	1.88%	1.82%	1.81%	1.83%	1.86%	1.86%	1.80%	1.76%	1.82%	1.92%			
Pollution Abatement & Control Spending	n/a	30.18	53.54	57.47	57.68	61.78	68.93	74.64	78.72	81.49	85.92	94.85	104.75	6.9%	7.0%	10.4%
Business	n/a	17.60	32.28	35.55	35.61	37.59	42.19	45.10	46.83	49.62	52.53	58.10	64.50	7.2%	7.4%	11.0%
Government & Other	n/a	12.58	21.26	21.92	22.07	24.19	26.74	29.54	31.89	31.87	33.39	36.75	40.25	6.6%	6.4%	9.5%

Source: Bureau of Economic Analysis
1989 and 1990 data are CMA estimates based on EPA data

TABLE 7.2
POLLUTION ABATEMENT CAPITAL EXPENDITURES (MILLION DOLLARS)*

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/85
Manufacturing	n/a	3638	3503	3485	3024	2045	2172	2810	2847	3053	3423	3945	4400	2.3%	9.4%	11.5%
Air	n/a	2236	2105	2194	1828	1029	1038	1292	1463	1499	1524	1660	1750	-1.8%	6.3%	5.4%
Water	n/a	1280	1147	1028	977	819	887	1018	1039	1101	1290	1525	1825	4.8%	12.4%	19.7%
Solid Waste	n/a	122	251	263	219	197	247	500	345	453	610	760	825	12.6%	10.5%	8.6%
Chemicals & Allied Products	n/a	780	781	753	628	395	418	738	624	790	1095	1350	1675	7.9%	17.8%	24.1%
Air	n/a	360	326	335	273	159	143	194	198	259	371	450	570	5.7%	24.1%	26.7%
Water	n/a	386	350	322	257	187	212	272	325	375	488	580	695	7.1%	20.6%	19.8%
Solid Waste	n/a	35	105	96	98	49	63	273	101	156	237	320	410	14.6%	8.5%	28.1%

* Data series begin in 1973
Source: Bureau of the Census
1989 and 1990 data are CMA estimates based on BEA, Census, and EPA data

U.S. industrial output has grown 40 percent since 1980. But contrary to popular opinion, pollution levels in most sectors have been declining.

Chart 7.3
Trends in Industrial Emissions

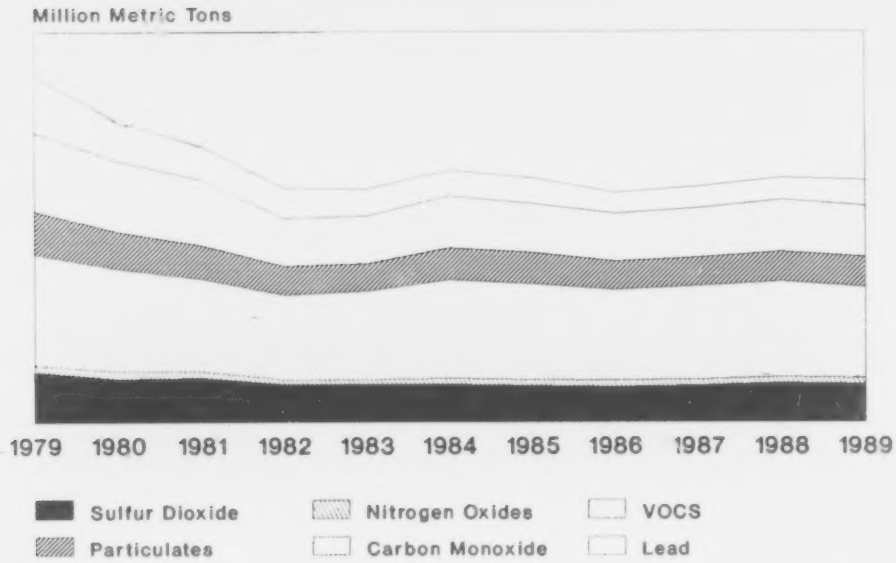


TABLE 7.3
POLLUTION ABATEMENT GROSS ANNUAL COSTS (MILLION DOLLARS)*

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/8(	1990/8[	1990/85
Manufacturing	n/a	3674	8142	9110	8565	9925	10888	11678	12258	13488	14009	15625	17400	7.9%	8.3%	11.4%
Air	n/a	1508	3298	3698	3456	3807	4189	4330	4262	4269	4467	4700	5025	4.3%	3.0%	6.9%
Water	n/a	1497	3193	3554	3489	3943	4296	4610	4820	4907	4223	4575	4975	4.5%	1.5%	8.7%
Solid Waste	n/a	670	1651	1856	1620	2175	2403	2738	3177	4312	5319	6350	7400	16.2%	22.0%	16.5%
Chemicals & Allied Products	n/a	807	1852	2048	2107	2198	2345	2540	2654	2836	3075	3375	3825	7.5%	8.5%	13.3%
Air	n/a	250	540	572	556	625	622	673	647	678	706	750	825	4.3%	4.2%	10.0%
Water	n/a	431	943	1069	1112	1106	1206	1268	1302	1292	1274	1345	1475	4.6%	3.1%	9.7%
Solid Waste	n/a	127	369	407	438	467	517	599	706	866	1094	1280	1525	15.2%	20.6%	19.1%

* Data series begin in 1973
Source: Bureau of the Census
1989 and 1990 data are CMA estimates based on BEA, Census, and EPA data

Chart 7.4
GNP Growth Versus Emissions Decline
1979=100

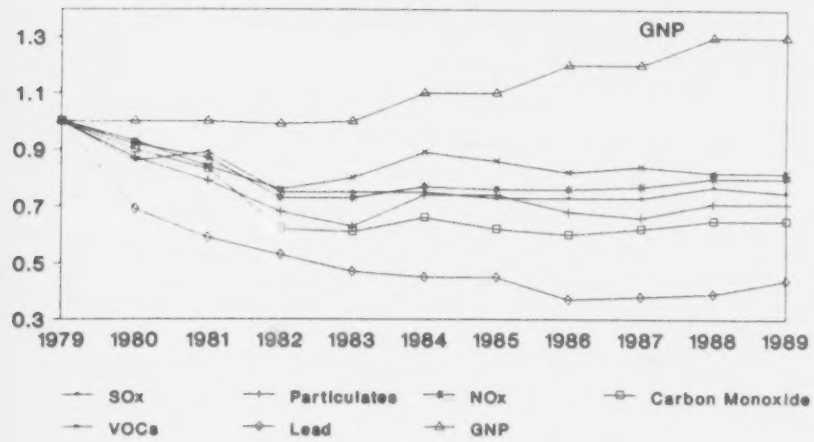
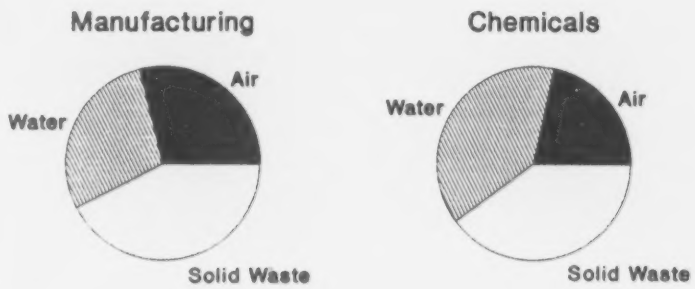
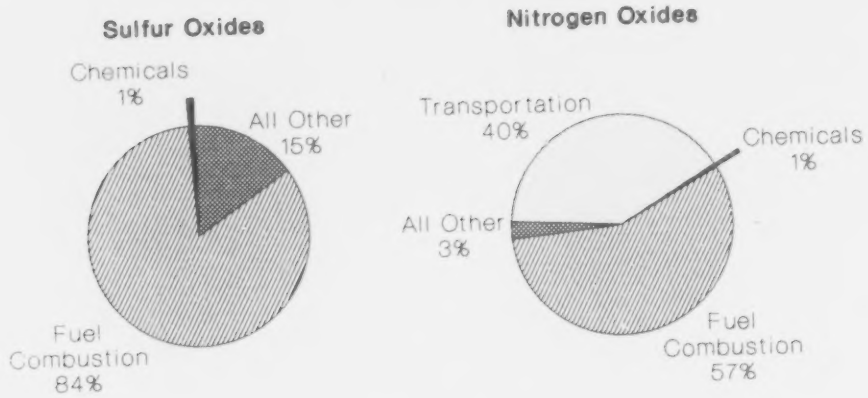


Chart 7.5
Composition of 1990 Pollution Abatement Costs



Industry typically is the source of only a relatively small portion of total sulfur oxide and nitrogen oxide emissions.

Chart 7.6
S02 and N0x Emissions By Source, 1989
(% of Total)



Fuel combustion includes stationary sources such as electric utility boilers, industrial boilers, and residential furnaces.

TABLE 7.4
SUMMARY OF PROGRESS IN KEY POLLUTION INDICATORS (MILLION METRIC TONS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Sulfur Dioxide													
Total Emissions	28.4	25.8	23.4	22.6	21.4	20.7	21.5	21.1	20.9	20.7	20.9	21.1	n/a
Industrial Processes	6.4	5.0	3.8	3.9	3.3	3.3	3.3	3.2	3.2	3.2	3.4	3.3	n/a
% of Total	22.5%	19.4%	16.2%	17.3%	15.4%	15.9%	15.3%	15.2%	15.3%	15.5%	16.3%	15.6%	
Chemicals & Allied Products	0.5	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	n/a
% of Total	1.9%	1.3%	1.1%	1.0%	0.8%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	
Nitrogen Oxides													
Total Emissions	18.5	19.5	20.9	20.9	20.0	19.3	19.8	20.0	19.1	19.5	20.0	19.9	n/a
Industrial Processes	0.7	0.7	0.7	0.6	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	n/a
% of Total	3.8%	3.5%	3.3%	3.1%	2.7%	2.8%	2.9%	2.8%	2.9%	2.9%	3.0%	3.0%	
Chemicals & Allied Products	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	n/a
% of Total	1.3%	1.1%	1.0%	0.9%	0.7%	0.7%	0.7%	0.7%	0.6%	0.7%	0.7%	0.5%	
Volatile Organic Compounds													
Total Emissions	25.0	21.1	22.6	21.3	19.6	20.4	21.2	20.2	19.1	19.4	19.5	18.5	n/a
Industrial Processes	8.9	8.3	9.2	8.3	7.5	7.9	8.8	8.5	8.1	8.3	8.1	8.1	n/a
% of Total	35.7%	39.5%	40.8%	39.1%	38.1%	38.6%	41.5%	42.2%	42.2%	42.8%	41.5%	43.8%	
Chemicals & Allied Products	1.6	1.9	1.8	1.7	1.5	1.7	1.9	1.8	1.8	1.8	1.9	1.9	n/a
% of Total	6.2%	9.1%	8.1%	8.2%	7.7%	8.5%	9.0%	9.0%	9.3%	9.2%	9.7%	10.3%	
Particulates													
Total Emissions	18.5	10.6	8.5	8.0	7.1	7.1	7.4	7.3	6.8	7.0	7.5	7.2	n/a
Industrial Processes	10.5	5.2	3.3	3.0	2.6	2.4	2.8	2.8	2.6	2.5	2.7	2.7	n/a
% of Total	57.0%	49.1%	38.8%	37.6%	36.0%	33.1%	37.6%	37.8%	38.2%	35.7%	36.0%	37.5%	
Chemicals & Allied Products	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	n/a
% of Total	1.2%	1.1%	1.6%	1.5%	1.4%	1.5%	1.8%	1.6%	1.3%	1.4%	1.3%	1.4%	
Carbon Monoxide													
Total Emissions	101.4	84.1	79.6	77.4	72.4	74.5	71.8	69.6	64.0	64.2	65.0	60.9	n/a
Industrial Processes	9.0	7.2	6.3	5.9	4.3	4.3	4.7	4.2	4.3	4.5	4.6	4.6	n/a
% of Total	8.8%	8.5%	8.0%	7.6%	6.0%	5.8%	6.5%	6.0%	6.7%	7.0%	7.1%	7.6%	
Chemicals & Allied Products	3.1	2.0	2.0	2.0	1.5	1.7	1.9	1.7	1.7	1.7	1.8	1.8	n/a
% of Total	3.0%	2.4%	2.5%	2.6%	2.1%	2.3%	2.6%	2.4%	2.7%	2.6%	2.8%	3.0%	

Source: Environmental Protection Agency

TABLE 7.5
U.S. EMISSIONS OF SULFUR OXIDES BY SOURCE (MILLION METRIC TONS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Sulfur Oxide Emissions	28.4	25.8	23.4	22.6	21.4	20.7	21.5	21.1	20.9	20.7	20.9	21.1	n/a
Transportation	0.6	0.7	0.9	0.9	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	n/a
Fuel Combustion	21.3	20.2	18.7	17.8	17.3	16.7	17.4	17.0	16.9	16.6	16.6	16.8	n/a
Industrial Processes	6.4	5.0	3.8	3.9	3.3	3.3	3.3	3.2	3.2	3.2	3.4	3.3	n/a
Chemicals & Allied Products	0.5	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	n/a
Other Industrial	5.9	4.7	3.5	3.7	3.1	3.1	3.1	3.0	3.0	3.0	3.2	3.1	n/a
Chemicals as a % of Total Emissions	1.9%	1.3%	1.1%	1.0%	0.8%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	

Source: Environmental Protection Agency

Chart 7.7
U.S. Emissions of Sulfur Oxides By Source

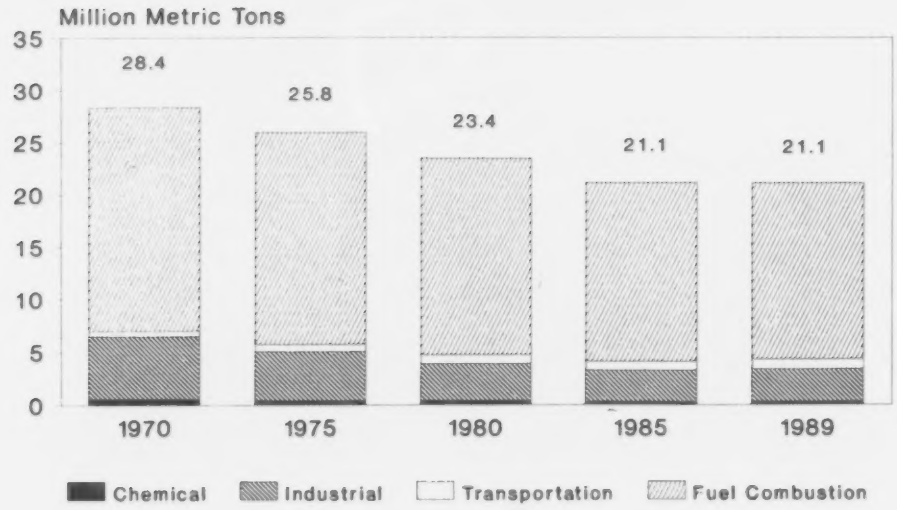
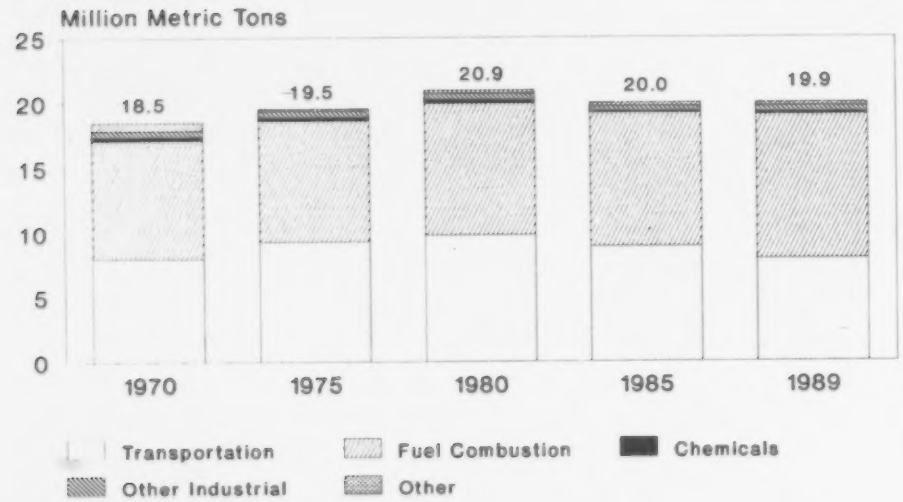


TABLE 7.6
U.S. EMISSIONS OF NITROGEN OXIDES BY SOURCE (MILLION METRIC TONS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Nitrogen Oxide Emissions	18.5	19.5	20.9	20.9	20.0	19.3	19.8	20.0	19.1	19.5	20.0	19.9	n/a
Transportation	8.0	9.3	9.8	10.0	9.4	8.9	8.8	8.9	8.3	8.1	8.1	7.9	n/a
Fuel Combustion	9.1	9.3	10.1	10.0	9.8	9.6	10.2	10.2	10.0	10.5	10.9	11.1	n/a
Industrial Processes	0.7	0.7	0.7	0.6	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	n/a
Chemicals & Allied Products	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	n/a
Other Industrial	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	n/a
Solid Waste	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	n/a
Miscellaneous	0.3	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.2	n/a
Chemicals as a % of Total Emissions	1.3%	1.1%	1.0%	0.9%	0.7%	0.7%	0.7%	0.7%	0.6%	0.7%	0.7%	0.5%	

Source: Environmental Protection Agency

Chart 7.8
U.S. Emissions of Nitrogen Oxides By Source



Industrial processes were only one of several sources of VOC and particulate emissions in 1989.

Chart 7.9
VOCs & Particle Emissions By Source,1989
(% of Total)

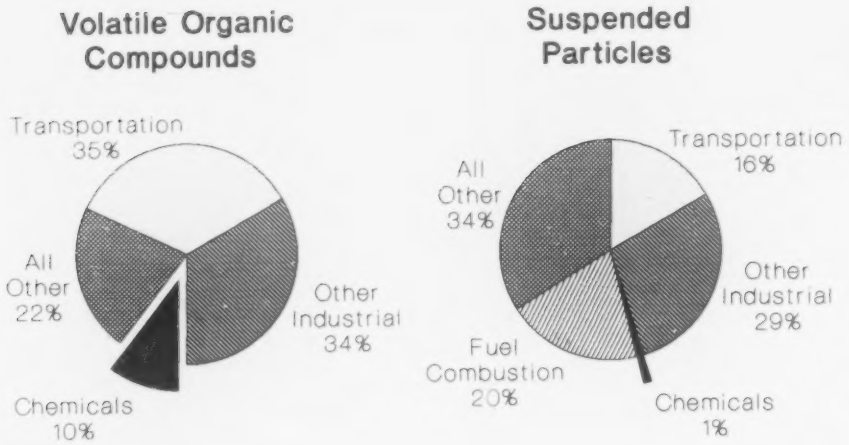


TABLE 7.7
U.S. EMISSIONS OF VOLATILE ORGANIC COMPOUNDS BY SOURCE (MILLION METRIC TONS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
VOC Emissions	25.0	21.1	22.6	21.3	19.6	20.4	21.2	20.2	19.1	19.4	19.5	18.5	n/a
Transportation	10.3	8.8	9.0	8.9	8.3	8.2	8.1	7.6	7.2	7.1	6.9	6.4	n/a
Fuel Combustion	0.6	0.6	0.9	0.9	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	n/a
Industrial Processes	8.9	8.3	9.2	8.3	7.5	7.9	8.8	8.5	8.1	8.3	8.1	8.1	n/a
Chemicals & Allied Products	1.6	1.9	1.8	1.7	1.5	1.7	1.9	1.8	1.8	1.8	1.9	1.9	n/a
Other Industrial	7.4	6.4	7.4	6.6	6.0	6.1	6.9	6.7	6.3	6.5	6.2	6.2	n/a
Solid Waste	1.8	0.9	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	n/a
Miscellaneous	3.3	2.5	2.9	2.5	2.2	2.7	2.7	2.6	2.3	2.5	2.9	2.5	n/a
Chemicals as a % of Total Emissions	6.2%	9.1%	8.1%	8.2%	7.7%	8.5%	9.0%	9.0%	9.3%	9.2%	9.7%	10.3%	

Source: Environmental Protection Agency

Chart 7.10
U.S. Emissions of Volatile Organic Compounds By Source

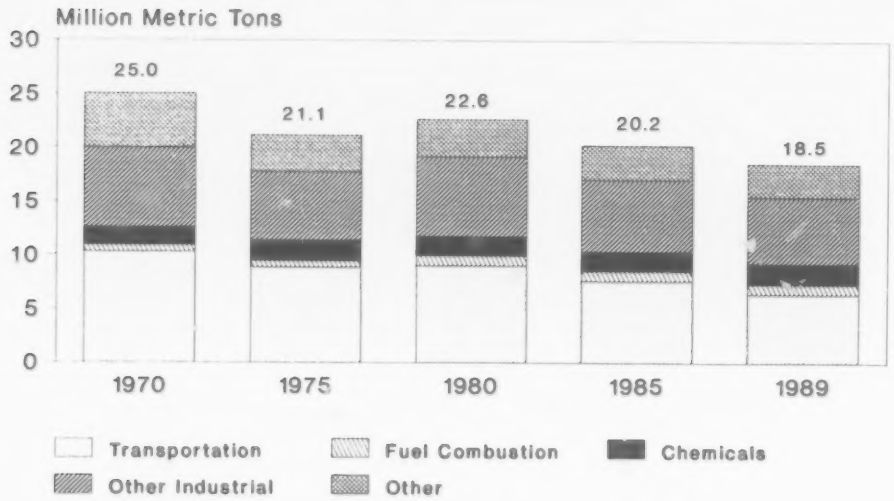


TABLE 7.8
U.S. EMISSIONS OF PARTICULATES BY SOURCE (MILLION METRIC TONS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Particulate Emissions	18.5	10.6	8.5	8.0	7.1	7.1	7.4	7.3	6.8	7.0	7.5	7.2	n/a
Transportation	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.5	1.5	n/a
Fuel Combustion	4.6	2.8	2.4	2.3	2.2	2.0	2.1	1.8	1.8	1.8	1.7	1.8	n/a
Industrial Processes	10.5	5.2	3.3	3.0	2.6	2.4	2.8	2.8	2.6	2.5	2.7	2.7	n/a
Chemicals & Allied Products	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	n/a
Other Industrial	10.3	5.1	3.2	2.9	2.5	2.2	2.7	2.6	2.5	2.4	2.6	2.6	n/a
Solid Waste	1.1	0.6	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	n/a
Miscellaneous	1.1	0.7	1.1	0.9	0.7	1.1	0.9	1.1	0.9	1.0	1.3	1.0	n/a
Chemicals as a % of Total Emissions	1.2%	1.1%	1.6%	1.5%	1.4%	1.5%	1.8%	1.6%	1.3%	1.4%	1.3%	1.4%	

Source: Environmental Protection Agency

TABLE 7.9
U.S. EMISSIONS OF CARBON MONOXIDE BY SOURCE (MILLION METRIC TONS)

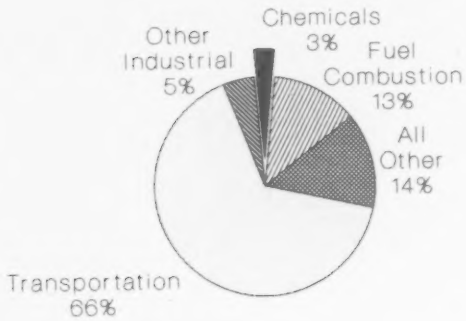
Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Carbon Monoxide Emissions	101.4	84.1	79.6	77.4	72.4	74.5	71.8	69.6	64.0	64.2	65.0	60.9	n/a
Transportation	74.4	65.0	56.1	55.4	52.9	52.4	50.6	47.9	44.6	43.3	41.2	40.0	n/a
Fuel Combustion	4.5	4.3	7.4	7.7	8.2	8.2	8.3	7.5	7.5	7.6	7.6	7.8	n/a
Industrial Processes	9.0	7.2	6.3	5.9	4.3	4.3	4.7	4.2	4.3	4.5	4.6	4.6	n/a
Chemicals & Allied Products	3.1	2.0	2.0	2.0	1.5	1.7	1.9	1.7	1.7	1.7	1.8	1.8	n/a
Other Industrial	5.9	5.2	4.3	3.9	2.8	2.6	2.8	2.5	2.6	2.8	2.8	2.8	n/a
Solid Waste	6.4	3.1	2.2	2.1	2.0	1.9	1.9	2.0	1.8	1.8	1.7	1.7	n/a
Miscellaneous	7.2	4.8	7.6	6.4	4.9	7.7	6.3	7.9	5.9	7.2	9.9	6.8	n/a
Chemicals as a % of Total Emissions	3.0%	2.4%	2.5%	2.6%	2.1%	2.3%	2.6%	2.4%	2.7%	2.6%	2.8%	3.0%	

Source: Environmental Protection Agency

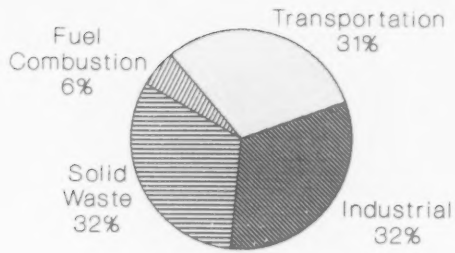
Industry typically is the source of only a small portion of carbon monoxide.

Chart 7.11
CO and Lead Emissions By Source, 1989
(% of Total)

Carbon Monoxide

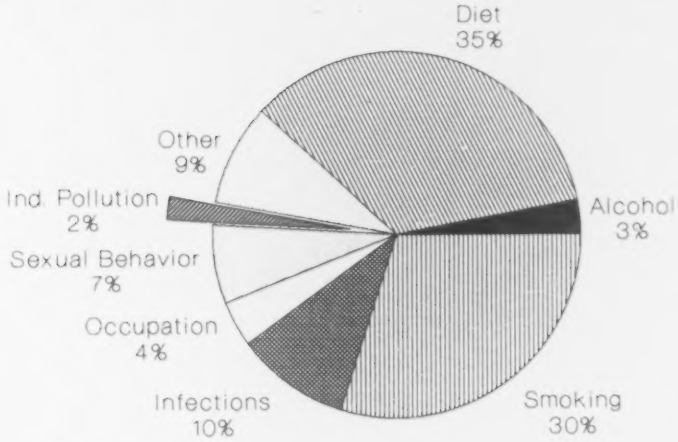


Lead



Air and water pollution from industrial sources typically are the cause of only a relatively small portion of total incidence of cancer, estimated at about 2 percent of the total.

Chart 7.12
Causes of Cancer in the United States



Source: *The Causes of Cancer: Quantitative Estimates of Avoidable Risks Of Cancer in the United States* by Richard Doll & Richard Peto (1981).

Smoking and diet are the dominant causes of cancer, accounting for about two-thirds of the total.

Toxic emissions by the Chemical industry declined 22 percent between 1987 and 1989 while production increased by nearly 9 percent.

Chart 7.13
Toxic Emissions by the Chemical Industry

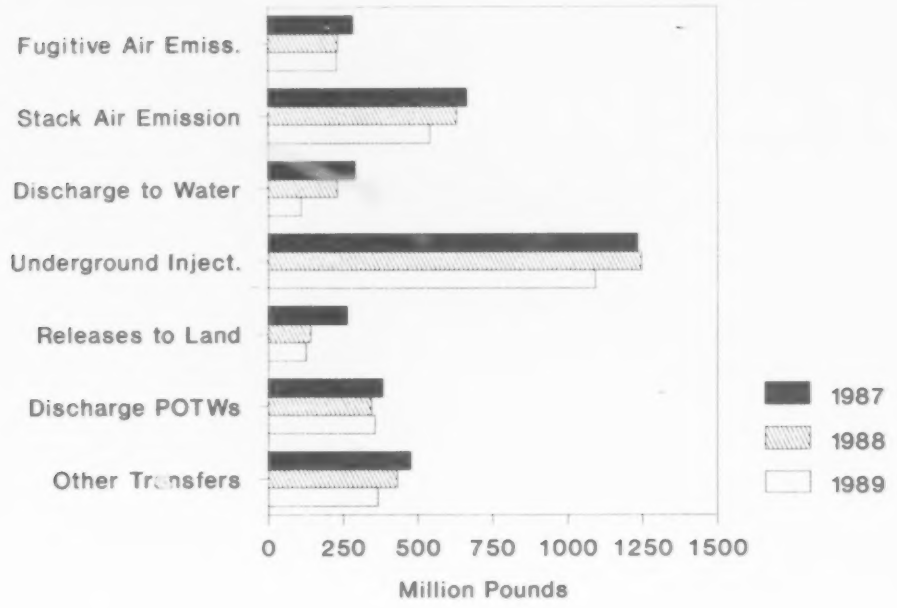


TABLE 7.10
U.S. EMISSIONS OF LEAD BY SOURCE (THOUSAND METRIC TONS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Lead Emissions	203.8	147.0	70.6	56.4	54.4	46.4	40.1	20.9	8.4	8.0	7.6	7.2	n/a
Transportation	163.6	122.6	59.4	46.9	46.9	40.8	34.7	15.5	3.5	3.0	2.6	2.2	n/a
Fuel Combustion	9.6	9.3	3.9	2.8	1.7	0.6	0.5	0.5	0.5	0.5	0.5	0.4	n/a
Industrial Processes	23.9	10.3	3.6	3.0	2.7	2.4	2.3	2.3	1.9	1.9	2.0	2.3	n/a
Solid Waste	6.7	4.8	3.7	3.7	3.1	2.6	2.6	2.6	2.6	2.6	2.5	2.3	n/a

Source: Environmental Protection Agency

TABLE 7.11
RADIATION LEVELS IN PASTEURIZED MILK (ANNUAL MEAN EXPOSURE IN PICOCURIES PER LITER)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Strontium-90	7.3	3.9	2.8	2.8	2.8	2.3	2.1	2.0	1.9	1.9	1.6	1.4	n/a			
Cesium-137	8.0	9.0	6.8	2.5	4.1	1.6	2.1	2.7	5.5	6.6	4.0	3.2	2.7	-8.8%	0.0%	-15.6%

Source: Environmental Protection Agency

TABLE 7.12
FARM FERTILIZER USE (MILLION TONS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Primary Nutrient Consumption *	16.1	17.6	23.1	23.7	21.4	18.1	21.8	21.7	19.7	19.1	19.6	19.6	20.6	-1.1%	-1.0%	5.1%

* Includes Nitrogen, Phosphorus, and Potash
Source: U.S. Department of Agriculture

TABLE 7.13
RISKS AND COST-EFFECTIVENESS OF SELECTED REGULATIONS AFFECTING THE U.S. CHEMICAL INDUSTRY

Regulation *1	Year Issued	Health or Safety	Agency	Baseline Mortality Risk per Million Exposed	Cost per Premature Death Averted ($ Millions 1990
Underground Construction Standards *2	1989	S	OSHA	38,700	0.1
Trihalomethane Drinking Water Standards	1979	H	EPA	420	0.2
Hazard Communication Standard *2	1983	S	OSHA	1,800	1.6
Benzene NESHAP (Original: Fugitive Emissions)	1984	H	EPA	1,470	3.4
Ethylene Dibromide Drinking Water Standard	1991	H	EPA	NA	5.7
Benzene NESHAP (Revised: Coke By-Products) *2	1988	H	EPA	NA	6.1
Abestos Occupational Exposure Limit *2	1972	H	OSHA	3,015	8.3
Benzene Occupational Exposure Limit *2	1987	H	OSHA	39,600	8.9
Arsenic Emission Standards for Glass Plants	1986	H	EPA	2,660	13.5
Ethylene Oxide Occupational Exposure Limit *2	1984	H	OSHA	1,980	20.5
Arsenic/Copper NESHAP	1986	H	EPA	63,000	23.0
Haz Waste Listing for Petroleum Refining Sludge	1990	H	EPA	210	27.6
Benzene NESHAP (Revised: Transfer Operations)	1990	H	EPA	NA	32.9
Acrylonitrile Occupational Exposure Limit *2	1978	H	OSHA	42,300	51.5
Abestos Occupational Exposure Limit *2	1986	H	OSHA	3,015	74.0
Arsenic Occupational Exposure Limit *2	1978	H	OSHA	14,800	106.9
Abestos Ban	1989	H	EPA	NA	110.7
Diethylstilbestrol (DES) Cattlefeed Ban	1979	H	FDA	22	124.8
Benzene NESHAP (Revised: Waste Operations)	1990	H	EPA	NA	168.2
1,2 - Dichloropropane Drinking Water Standard	1991	H	EPA	NA	653.0
Haz Waste Land Disposal Ban (1st 3rd)	1988	H	EPA	2	4,190.4
Municipal Solid Waste Landfill Standards (Proposed)	1988	H	EPA	<1	19,107.0
Formaldehyde Occupational Exposure Limit *2	1987	H	OSHA	31	86,201.8
Atrazine/Alachlor Drinking Water Standard	1991	H	EPA	NA	92,069.7
Haz Waste Listing for Wood Preserving Chemicals	1990	H	EPA	<1	5,700,000.0

*1 - 70-year lifetime exposure assumed unless otherwise specified.
*2 - 45-year lifetime exposure.
NA=Not Available.

Source: John F. Morrall, III, "A Review of The Record", Regulation, Vol 10, No. 2 (1986), p. 30. Updated by the Author, et al.

- A form of cost-benefit analysis, cost-effectiveness analysis attempts to determine the least cost of achieving a regulatory objective, in most cases the value of saving a statistical life. Baseline risks generally reflect the mortality risk per million of statistical lives exposed. In most cases the actual number of persons exposed is much less. Further, a 70 or 45 year lifetime exposure is often assumed. Given the mobility of the American labor force, actual exposure is often much lower. The cost per premature death averaged, or prevented, is based on the cost per estimated statistical life saved from regulatory policies. Because the actual risk is often lower, the actual costs per estimated life saved is generally much higher than original estimates.

The chemical industry's incidence of injury and illness is one of American industry's lowest.

Chart 7.14
Incidence of Injury and Illness

Source: Bureau of Labor Statistics.

Changes in reporting requirements in 1985 coupled with improved reporting may be significant factors in trends observed in the period 1985 to 1989.

TABLE 7.14
OCCUPATIONAL INJURY & ILLNESS RATES (PER 100 FULL-TIME EMPLOYEES)*

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Manufacturing:													
Total Cases	n/a	13.0	12.2	11.5	10.2	10.0	10.6	10.4	10.6	11.9	13.1	13.1	n/a
Lost Workday Cases	n/a	4.5	5.4	5.1	4.4	4.3	4.7	4.6	4.7	5.3	5.7	5.8	n/a
Nonfatal Cases, No Lost Workdays	n/a	8.5	6.8	6.4	5.8	5.7	5.9	5.8	5.9	6.7	7.3	n/a	n/a
Lost Workdays	n/a	75.8	86.7	82.0	75.0	73.5	77.9	80.2	80.6	95.5	107.4	113.0	n/a
Chemicals & Allied Products:													
Total Cases	n/a	8.4	6.8	6.6	5.7	5.5	5.3	5.1	6.3	7.0	7.0	7.0	n/a
Lost Workday Cases	n/a	2.9	3.1	3.0	2.5	2.5	2.4	2.3	2.7	3.1	3.3	3.2	n/a
Nonfatal Cases, No Lost Workdays	n/a	5.5	3.7	3.6	3.2	3.0	2.8	2.8	3.5	3.9	3.8	n/a	n/a
Lost Workdays	n/a	48.9	50.3	48.1	39.4	42.3	40.8	38.8	49.4	58.8	59.0	63.4	n/a

* Data series begin in 1972 and 1973
Source: Bureau of Labor Statistics

Section 8
Energy

The U.S. chemical industry is energy intensive and relies on energy inputs not only as fuel and power for its operations, but also as raw materials, or feedstocks, in the production of many of its products. Chemical industry energy consumption for these purposes amounted to 5.7 quads (quadrillion BTUs) in 1990, about 7 percent of total U.S. energy consumption. The industry's energy needs are equivalent to about 2.7 million barrels of crude oil per day, but are drawn from a wide mix of energy sources:

Crude Oil and Derivatives	45%
Natural Gas	30%
Electricity	17%
Coal	6%
Others	2%
Total	100%

Fuel and power accounted for 58 percent (3.3 quads) of total chemical industry energy consumption, with feedstocks accounting for the remaining 2.4 quads (42 percent) of energy consumed. The chemical industry is the single largest user of natural gas, accounting for 10 percent of all U.S. natural gas consumption. The chemical industry is also a large user of petroleum products, accounting for about 6 percent (1.1 million barrels of oil per day) of all U.S. petroleum products consumption.

Energy represents a significant share of U.S. chemical industry manufacturing costs. For some products, energy for both fuel and power needs and feedstocks account for up to 85 percent of total production costs. In 1990, the industry spent an estimated $22 billion on purchases of fuel and power and feedstocks.

Overall, however, this energy cost represents only 8 percent of the value of industry shipments. Moreover, value-added by the industry is equivalent to five times this energy cost, which is just one of many inputs, including raw materials and services, that it purchases from other industries.

The U.S. chemical industry has achieved significant energy productivity gains. Energy consumption per unit of output declined by 43 percent between 1974 and 1990, a trend that should continue in the 1990s. Further improvements in energy productivity are essential, however, for the U.S. chemical industry to maintain its competitive edge in domestic and world markets.

During the past decade, the U.S. chemical industry has made significant progress in improving energy efficiency.

Chart 8.1

Energy Productivity Trends

Energy consumed per unit output 1987=100

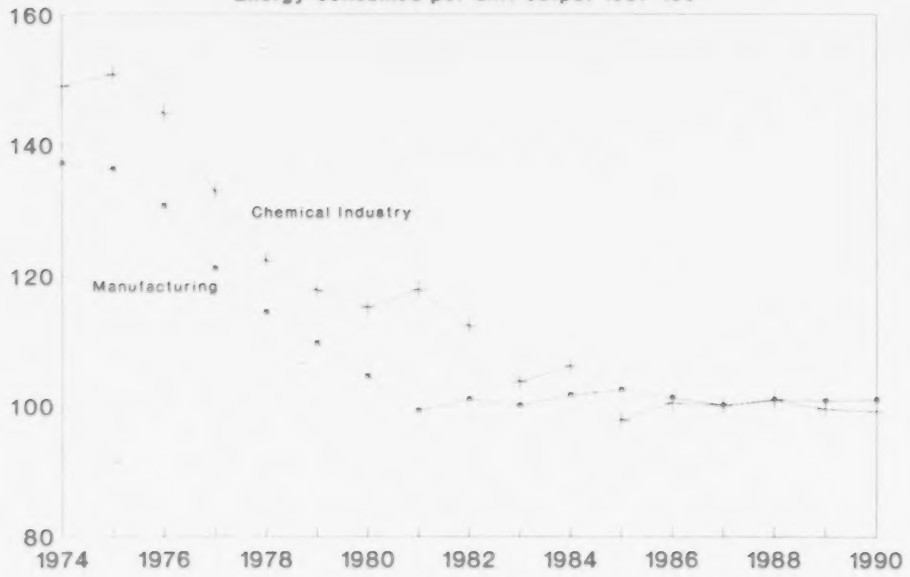


TABLE 8.1
FUEL AND POWER CONSUMPTION (TRILLION BTUS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Manufacturing	12710	12084	11946	11563	11224	11737	13170	13615	13846	14512	15489	15913	16094	3.0%	3.4%	1.1%
Chemicals & Allied Products	2528	2806	2721	2830	2474	2442	2613	2407	2559	2694	2862	2908	2942	0.8%	4.1%	1.2%

Source: Bureau of the Census, Federal Reserve Board, Department of Energy, CMA estimates

TABLE 8.2
CHEMICAL INDUSTRY FEEDSTOCK CONSUMPTION (TRILLION BTUS)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Total Feedstock Consumption	1604	1710	2543	2339	1800	1815	2128	2160	2249	2201	2317	2271	2406	-0.6%	2.2%	5.9%
Liquefied Gases:	381	492	508	509	461	500	809	814	744	748	813	777	769	4.2%	-1.1%	-1.0%
Ethane	260	379	385	388	356	376	663	646	557	547	587	523	567	3.9%	-2.6%	8.5%
Propane & Propylene*	77	84	100	103	99	103	109	115	120	126	139	149	137	3.2%	3.7%	-7.9%
Butane & Butylene	38	20	19	13	4	20	31	41	48	52	60	69	41	7.8%	-0.2%	-40.5%
Isobutane	6	9	4	4	2	1	5	11	19	23	27	36	23	19.6%	15.5%	-36.8%
Heavy Liquids:	559	652	1422	1261	925	880	831	828	1045	995	1033	1029	1159	-2.0%	7.0%	12.6%
Naphtha	301	281	475	441	316	284	276	236	341	348	356	389	351	-3.0%	8.3%	-9.7%
Other Oils	182	277	862	729	522	512	470	505	610	555	583	546	717	-1.8%	7.3%	31.3%
Still Gas	76	95	85	91	87	85	85	87	93	92	94	93	92	0.8%	1.2%	-1.4%
Natural Gas	624	528	586	544	393	414	468	500	442	441	455	452	460	-2.4%	-1.6%	1.7%
Coal	41	37	27	26	21	20	20	19	18	17	16	15	19	-3.3%	0.2%	28.8%

* Some propane and propylene consumption is included in the natural gas data.
Sources: American Gas Association, Bureau of the Census, Bureau of Mines,
Department of Energy, CMA estimates

TABLE 8.3
ELECTRIC POWER USE (1987=100)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Manufacturing	n/a	84.0	96.9	97.3	87.1	90.8	97.8	95.5	96.1	100.0	104.7	108.0	109.1	1.2%	2.7%	1.0%
Chemicals & Allied Products	n/a	98.2	100.9	100.3	92.4	97.5	102.0	99.0	98.0	100.0	99.9	109.9	113.8	1.2%	2.8%	3.5%
Industrial Inorganic Chemicals	n/a	118.8	109.0	106.9	98.8	101.6	106.5	100.9	98.4	100.0	95.8	112.6	118.8	0.9%	3.3%	5.5%
Plastics Materials and Synthetics	n/a	61.4	79.8	80.6	73.0	86.7	91.2	90.9	95.5	100.0	106.1	106.3	104.9	2.8%	2.9%	-1.3%
Drugs	n/a	55.0	73.7	76.9	79.1	83.8	86.6	90.0	97.0	100.0	107.1	106.0	108.1	3.9%	3.7%	2.0%
Soaps, Cleaners, and Toilet Goods	n/a	70.2	79.5	80.0	79.9	86.1	88.4	92.0	98.5	100.0	107.6	111.8	114.3	3.7%	4.4%	2.2%
Industrial Organic Chemicals	n/a	123.0	138.1	138.9	122.4	126.1	113.6	106.5	99.6	100.0	94.3	99.0	105.6	-2.6%	-0.2%	6.7%
Agricultural Chemicals	n/a	92.0	134.0	137.1	117.1	107.9	115.5	111.3	102.1	100.0	104.7	104.4	103.3	-2.6%	-1.5%	-1.1%

Source: Federal Reserve Board

TABLE 8.4
ENERGY INPUT PRICES

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Crude Oil, Wellhead ($/bbl)	3.18	7.67	21.59	31.77	28.52	26.19	25.88	24.09	12.51	15.40	12.58	15.86	20.03	-0.7%	-3.6%	26.3%
Natural Gas, Wellhead ($/000 cubic feet)	0.17	0.44	1.59	1.98	2.46	2.59	2.66	2.51	1.94	1.67	1.69	1.69	1.72	0.8%	-7.3%	1.8%
Coal, Mine Value ($/ton)	6.26	19.23	24.52	26.29	27.14	25.85	25.51	25.10	23.70	23.00	22.09	21.77	21.94	-1.1%	-2.7%	0.8%
Industrial Electricity Rates (cents/kWh)	n/a	2.1	3.7	4.3	5.0	5.0	5.0	5.2	4.9	4.7	4.6	4.7	4.8	2.6%	-1.6%	2.1%

Source: Department of Energy

TABLE 8.5
OIL IMPORT DEPENDENCE (THOUSAND BARRELS PER DAY)

Item/Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
Petroleum Products Supplied	14695	16332	17056	16058	15296	15231	15726	15726	16281	16665	17283	17325	16916	-0.1%	1.5%	-2.4%
% Imports	23.3%	37.1%	40.5%	37.3%	33.4%	33.2%	34.6%	32.2%	38.2%	40.1%	42.8%	46.5%	47.0%	--	--	--
Crude Oil and Petroleum Products Imports	3419	6056	6909	5996	5113	5051	5437	5067	6224	6678	7402	8061	7954	1.4%	9.4%	-1.3%

Source: Department of Energy

Section 9
State Chemical Industries

The regions and states of the United States are economically interdependent. Each state's economy depends on the continuing availability of goods and services from other states and on its ability to sell its goods and services throughout the nation.

The U.S. chemical industry takes certain petroleum products, natural gas, and other naturally-occurring raw materials and converts them into a wide variety of basic chemicals. These basic chemicals (including petrochemicals such as ethylene, propylene, and butadiene) are then transferred to other sectors of the chemical industry for conversion into chemical intermediates (phthalic anhydride, vinyl chloride, etc.) and final chemical products such as plastics, man-made fibers, synthetic rubber, etc. In turn, these chemical industry products are fabricated by many different industries into thousands of essential industrial and consumer products.

The United States was an early leader in developing a chemical industry. The industry has gone through several growth phases, the first of which centered around the turn of the century. The most recent period of rapid growth began during World War II. Much of this growth in the basic chemicals (and petrochemicals) segment of the industry has been concentrated along the U.S. Gulf Coast, where necessary petroleum and natural gas raw materials (or feedstocks) are available. Much of basic chemicals production is still concentrated in the Gulf Coast area, with Texas and Louisiana producing about 70 percent of all primary petrochemicals. The conversion of these basic chemicals into plastics, man-made fibers, synthetic rubber, and other chemical products is not as heavily concentrated on the Gulf Coast. Instead, the foci of production tend to be more diffuse. For example, the majority of total man-made fiber production occurs in the Southeast, while production of other chemical products such as plastics, pharmaceuticals, and fertilizers is even more widely dispersed among the states.

In rank order, the ten leading states in chemical shipments are Texas, New Jersey, Louisiana, Illinois, Ohio, California, New York, Pennsylvania, North Carolina, and Indiana. Combined, the chemical industry in these 10 states employed nearly 633,000 people and accounted for 63 percent of total industry shipments in 1986.

Although the chemical industry makes a vital contribution to the economy of every state, 63 percent of chemical production is concentrated in 10 states.

Chart 9.1

Chemical Shipments by State - 1987

($229 Billion)

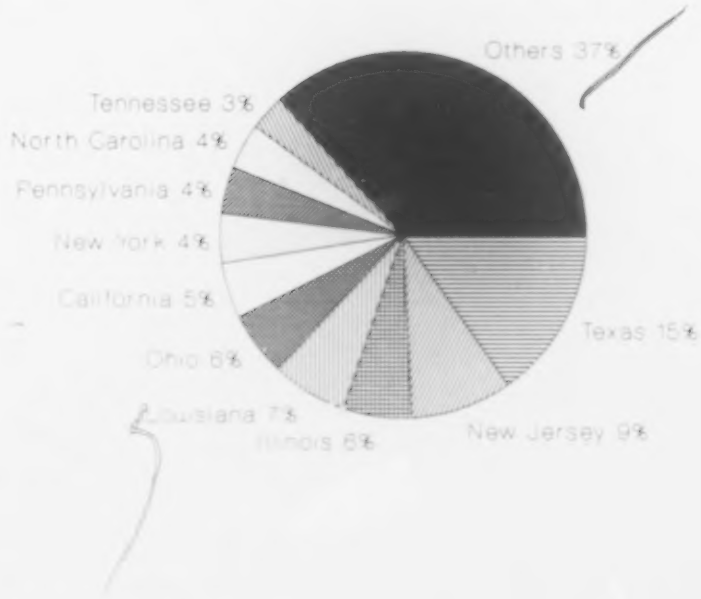


TABLE 9.1
TOP 30 CHEMICAL PRODUCING STATES

State	Value of Chemical Shipments (million $) 1987	Chemical Gross State Product (million $) 1986	Total Gross State Product (million $) 1986	Chemical % of Total Product (%) 1986	Chemical Employment (thousands) 1989	Downstream Chemical Employment (thousands) 1989	Wages and Salaries (million $) 1989	Chemical Establishments (number) 1987	Chemical Exports * (million $) 1987
1 Texas	34659	6383	303510	2.1%	80.4	601.8	3342	911	9770
2 New Jersey	20301	6898	154765	4.5%	119.4	446.6	4921	912	2641
3 Louisiana	15315	1992	74426	2.7%	28.2	121.8	1208	242	3969
4 Illinois	13835	4318	209666	2.1%	61.1	781.1	2281	724	1780
5 Ohio	12967	3874	176102	2.2%	65.2	827.6	2404	656	1956
6 California	11097	3734	533816	0.7%	74.9	1540.7	2526	1423	1524
7 New York	10017	4278	362736	1.2%	60.3	875.1	2289	746	1431
8 Pennsylvania	9361	3739	183559	2.0%	59.9	750.5	2415	564	1277
9 North Carolina	9102	1980	100961	2.0%	44.0	677.8	1431	321	1405
10 Indiana	8081	2120	84922	2.5%	30.7	521.2	1256	252	1145
11 Tennessee	7149	1746	72328	2.4%	39.3	378.2	1276	243	1681
12 Michigan	7073	2159	153240	1.4%	44.6	836.3	1736	402	1794
13 South Carolina	6730	1846	44727	4.1%	36.4	345.3	1347	169	1616
14 Virginia	6241	1702	104155	1.6%	31.8	277.7	1050	175	1643
15 Missouri	5570	1897	83534	2.3%	30.0	320.7	1247	345	672
16 Florida	5458	1152	177729	0.6%	23.4	403.0	732	493	1641
17 Georgia	5162	1374	102922	1.3%	19.4	425.4	573	408	701
18 West Virginia	4367	1135	24096	4.7%	17.8	64.0	718	70	1339
19 Kentucky	4058	793	53135	1.5%	13.7	227.7	476	146	766
20 Alabama	3434	616	55007	1.1%	11.4	297.6	404	167	706
21 Maryland	3007	919	76504	1.2%	13.6	164.6	433	161	353
22 Connecticut	2847	1387	70639	2.0%	21.2	304.4	941	166	517
23 Delaware	2531	1573	11706	13.4%	33.3	58.1	1560	47	351
24 Massachusetts	2402	874	115526	0.8%	18.3	484.6	696	303	355
25 Wisconsin	2366	661	76922	0.9%	10.7	446.5	380	254	230
26 Kansas	2268	598	42472	1.4%	7.8	101.2	247	115	218
27 Iowa	1973	794	43836	1.8%	6.4	156.0	193	126	307
28 Washington	1648	624	77683	0.8%	12.2	264.8	455	174	267
29 Minnesota	1608	439	75626	0.6%	n/a	263.7	308	185	121
30 Mississippi	1552	447	31830	1.4%	6.4	154.3	183	86	440
United States	228648	70100	4240300	1.7%	1073.8	17878.0	40271	12039	43749

* Includes both direct and supporting exports.
Source: Bureau of the Census, Bureau of Economic Analysis

Section 10
World Chemical Industries

The chemical industry is worldwide in scope. Virtually every nation has a chemical industry and is engaged in the foreign trade of chemical raw materials, industrial chemicals, or chemical products. The bulk of the free world's estimated $980 billion chemical output is accounted for by a handful of industrialized developed nations. Combined, the United States, Japan, West Germany, France, the United Kingdom, Italy, Spain, Belgium/Luxembourg, the Netherlands, and Canada accounted for 77 percent of total free world chemical output (turnover) in 1989.

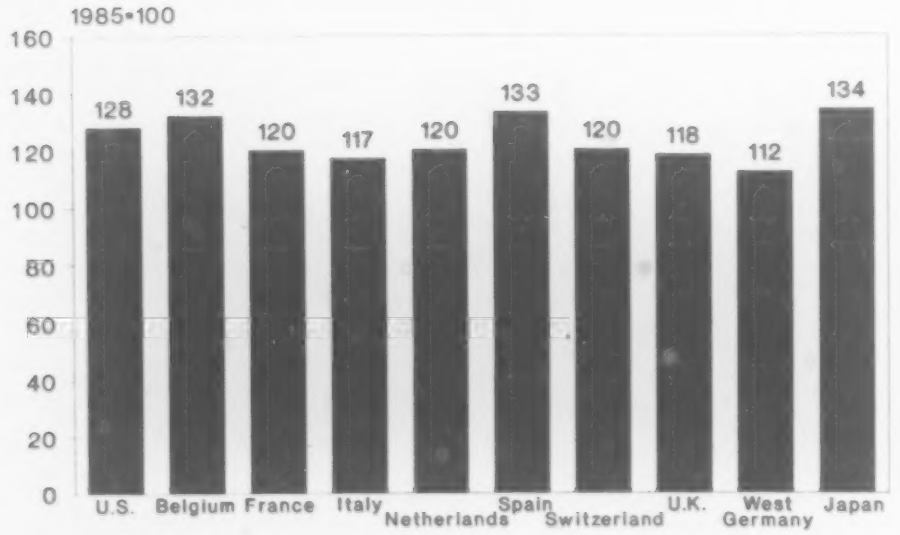
The United States alone produced $275 billion, about 27 percent of the total. Japan has the second largest chemical industry with 1989 output value at $161 billion. This was followed by West Germany ($85 billion), France ($55 billion), and the United Kingdom ($42 billion). The chemical industries of these industrialized developed nations typically produce a wide variety of chemicals ranging from commodity industrial chemicals to specialty chemicals that are tailored for unique applications. Each also has a large body of technological knowledge in research and process engineering, abundant capital and management skills, and skilled and technically competent labor forces. Many of these industrialized developed nations (West Germany, United States, the Netherlands, Switzerland, France, and the United Kingdom) have historically maintained a trade surplus in chemicals. West Germany was the largest exporter ($46 billion), followed by the United States ($37 billion), France ($23 Billion), the Netherlands ($22 billion), and the United Kingdom ($20 billion). Japan exports a relatively small portion of its output.

In developing nations, domestic chemical industries are generally involved in making simple chemical products such as fertilizers and inorganic commodity chemicals. Some also produce minor volumes of specialty chemicals. Up until the last decade, these developing nations represented export markets for the chemical industries of the developed nations. During the 1980s, however, many developing nations have embarked on ambitious programs to develop globally competitive chemical industries. This group includes many of the newly industrializing countries (NICs) of Asia such as Singapore, South Korea, Taiwan, and Thailand. Many of the larger economies of Latin America (Argentina, Brazil, Mexico and Venezuela) have also initiated large investments in their chemical industries.

A major development beginning in the 1960s has been the globalization of the chemical industry. This was fostered by world economic growth, the reduction of tariffs and other trade barriers which promoted world trade, and advances in telecommunications and air transportation. This was also aided by the availability of capital resources, technology, and managerial capabilities. It has resulted in the emergence of multinational chemical companies. Although a number of large companies had foreign subsidiaries for many years, international investment by American and Western European companies has grown at a rapid pace in recent years.

Since 1985, the output of chemicals has increased fastest in Japan, Spain, and Belgium.

Chart 10.1
World Chemical Production Indices
1990



In terms of employees, the U.S. chemical industry is by far the largest, followed by West Germany, Japan, and the United Kingdom.

Chart 10.2
World Chemical Industry Employment
1990

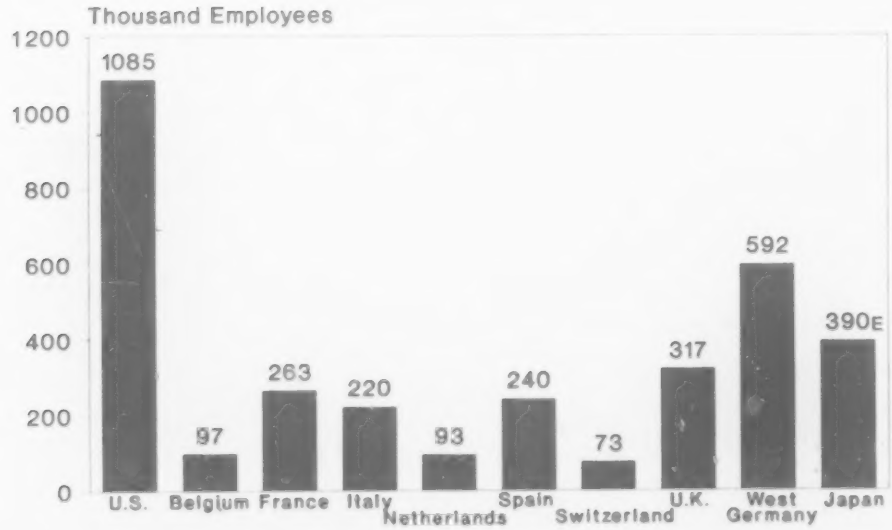


TABLE 10.1
CHEMICAL INDUSTRY PRODUCTION INDICES, SELECTED COUNTRIES (1985=100)

Country/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
United States	90.2	95.4	88.0	93.9	96.3	100.0	104.1	110.2	119.5	126.0	127.9	3.6%	5.0%	1.5%
Belgium/Luxembourg	84.5	85.4	96.9	90.6	97.0	100.0	102.6	110.6	120.2	124.9	132.3	4.6%	5.8%	5.9%
France	86.0	86.0	86.4	93.5	98.3	100.0	101.0	104.1	111.4	118.2	120.3	3.4%	3.8%	1.8%
Italy	91.2	88.2	88.1	91.2	96.8	100.0	101.4	103.6	112.5	115.0	117.1	2.5%	3.2%	1.8%
Netherlands	75.2	75.8	75.6	82.9	91.7	100.0	100.0	104.0	112.0	118.0	120.0	4.8%	3.7%	1.7%
Spain	88.3	86.9	88.3	92.5	98.1	100.0	105.0	112.4	122.5	128.6	132.5	4.1%	5.8%	3.0%
Switzerland	81.4	84.8	83.8	89.2	94.1	100.0	102.1	105.3	109.4	119.0	119.6	3.9%	3.6%	0.5%
United Kingdom	83.3	83.3	83.8	90.3	95.8	100.0	101.5	108.8	113.9	119.3	118.2	3.6%	3.4%	-0.9%
West Germany	91.3	91.0	87.4	93.6	98.5	100.0	99.2	101.0	106.5	109.4	112.4	2.1%	2.4%	2.7%
Japan	81.7	81.5	83.8	88.9	96.3	100.0	100.5	111.1	120.4	128.7	134.4	5.1%	6.1%	4.4%

Source: CEFIC

TABLE 10.2
CHEMICAL INDUSTRY PRICE INDICES, SELECTED COUNTRIES (1985=100)

Country/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
United States	85.9	94.9	96.5	96.7	96.3	100.0	98.9	102.3	112.1	118.8	119.4	3.3%	3.6%	0.5%
Belgium/Luxembourg	69.0	76.3	86.9	92.2	96.5	100.0	97.7	94.0	96.5	102.1	98.8	3.7%	-0.2%	-3.2%
France	65.2	74.4	81.0	87.7	95.6	100.0	98.8	96.3	98.8	103.2	103.2	4.7%	0.6%	0.0%
Italy	62.6	70.1	77.7	84.5	92.8	100.0	97.3	100.4	107.5	110.7	111.5	5.9%	2.2%	0.7%
Netherlands	81.3	93.0	92.7	93.5	94.3	100.0	85.4	87.0	88.0	92.0	89.0	0.9%	-2.3%	-3.3%
Spain	56.6	66.0	74.1	83.4	91.7	100.0	101.0	102.5	104.6	108.3	112.1	7.1%	2.3%	3.5%
Switzerland	87.9	92.2	93.9	93.5	95.9	100.0	97.3	90.8	91.9	93.0	97.9	1.1%	-0.4%	5.3%
United Kingdom	76.0	80.9	86.2	90.5	95.1	100.0	101.7	105.8	111.5	116.4	121.7	4.8%	4.0%	4.6%
West Germany	82.5	89.7	93.7	93.9	97.4	100.0	94.2	91.1	92.4	95.2	93.8	1.3%	-1.3%	-1.5%
Japan	107.9	105.8	104.5	102.5	101.4	100.0	91.5	92.5	89.9	91.4	n/a			

Source: CEFIC

During the 1980's, the U.S. share of world chemical exports declined and its share of world imports increased.

Chart 10.3
U.S. Shares of World Chemical Exports and Imports

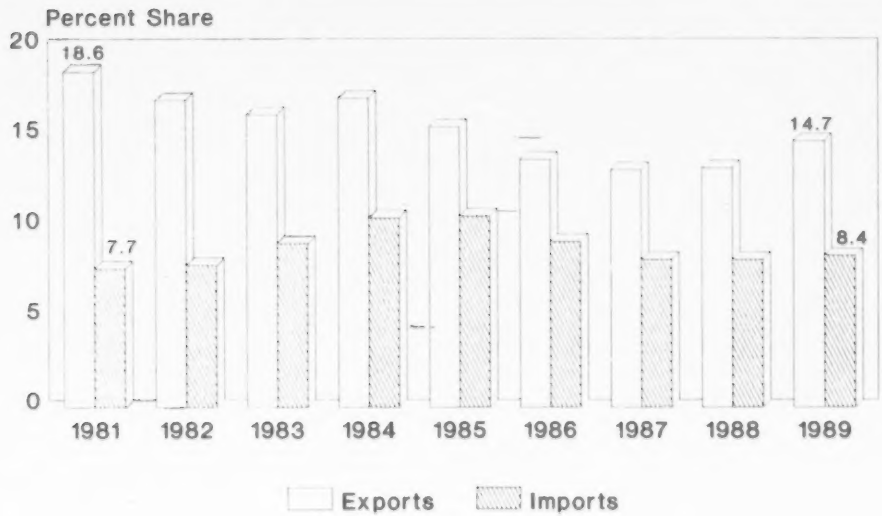


TABLE 10.3
CHEMICAL INDUSTRY EMPLOYMENT, SELECTED COUNTRIES (THOUSAND EMPLOYEES)

Country/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Annual Growth Rates 1990/80	1990/85	1990/89
United States	1107	1109	1075	1043	1049	1044	1022	1026	1059	1074	1085	-0.2%	0.8%	1.1%
Belgium/Luxembourg	90	89	88	87	88	90	91	91	92	95	97	0.8%	1.5%	1.8%
France	296	289	280	282	279	272	268	268	257	264	263	-1.2%	-0.7%	-0.4%
Italy	283	271	259	251	241	233	230	225	223	217	220	-2.5%	-1.1%	1.4%
Netherlands	91	91	90	88	89	89	91	91	92	93	93	0.2%	0.9%	0.5%
Spain	244	244	243	242	241	240	239	239	239	240	240	-0.2%	0.0%	0.0%
Switzerland	63	63	68	68	65	67	68	69	70	72	73	1.5%	1.7%	1.4%
United Kingdom	431	403	348	330	329	339	328	320	320	323	317	-3.0%	-1.3%	-1.9%
West Germany	568	565	559	549	550	557	567	572	575	582	592	0.4%	1.2%	1.7%
Japan	411	409	405	402	396	396	395	396	391	390	n/a			

Source: CEFIC

TABLE 10.4
WORLD CHEMICALS EXPORTS BY PRODUCT COMPOSITION (BILLION DOLLARS)
SITC 5 CHEMICALS AND RELATED PRODUCTS

Item/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989
World Exports	123.5	117.0	122.1	131.2	136.9	162.1	195.9	238.3	246.8
of which:									
51 Organic Chemicals	31.7	29.1	32.5	35.6	37.1	41.2	49.9	62.7	66.4
52 Inorganic Chemicals	15.7	15.1	14.9	15.9	16.8	18.2	20.4	23.9	24.1
53 Dyes, Tanning	7.2	7.0	7.2	7.3	7.7	10.2	12.8	15.1	15.9
54 Medicinal, Pharmaceuticals	13.3	14.5	13.9	14.1	15.4	20.0	23.7	27.1	27.2
55 Perfume, Cleaning	7.0	6.7	6.8	7.2	7.6	9.6	12.0	13.8	14.6
56 Fertilizers, Manufacturing	7.1	5.9	6.1	7.2	7.4	7.4	8.4	10.1	9.7
57 Explosives, Pyrotechnics	0.5	0.5	0.5	0.6	0.6	0.6	0.7	1.7	1.1
58 Plastic Materials	24.7	23.8	25.6	27.7	28.1	35.6	45.0	56.4	59.4
59 Chemical Materials NES	16.4	14.4	14.6	15.6	16.1	19.2	23.0	27.4	28.4

Source: CMA World Manufactures Trade Database

TABLE 10.5
COUNTRY SHARE OF WORLD CHEMICAL IMPORTS AND EXPORTS (% OF TOTAL)
SITC 5 CHEMICALS AND RELATED PRODUCTS

Country/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989
Exports:									
United States	18.6%	17.0%	16.2%	17.1%	15.5%	13.7%	13.1%	13.2%	14.7%
Canada	3.2%	2.9%	3.0%	3.2%	3.0%	2.5%	2.4%	2.6%	2.6%
Japan	5.4%	5.3%	5.6%	5.7%	5.5%	5.8%	5.9%	5.8%	5.9%
EC	57.6%	59.3%	59.0%	57.7%	58.8%	60.4%	61.1%	59.3%	58.4%
To External	26.6%	26.8%	27.1%	26.8%	27.1%	26.4%	25.8%	25.1%	24.5%
West Germany	17.8%	18.1%	18.2%	17.8%	17.7%	19.3%	19.5%	18.3%	17.8%
France	9.8%	10.0%	9.7%	9.6%	10.0%	10.3%	10.4%	9.9%	9.7%
Italy	4.2%	4.5%	5.0%	4.7%	4.8%	4.4%	4.5%	4.3%	4.4%
United Kingdom	8.8%	9.1%	8.6%	8.4%	8.9%	8.8%	8.8%	8.5%	8.2%
Other Western Europe	8.6%	8.7%	8.9%	8.4%	8.7%	9.6%	9.9%	9.6%	8.8%
Asian NICs	0.6%	0.9%	1.0%	1.2%	1.2%	1.3%	1.4%	2.3%	2.5%
EE - U.S.S.R.	1.9%	1.7%	1.8%	1.8%	2.0%	1.7%	1.5%	1.8%	1.4%
Developing Countries	3.5%	3.5%	4.1%	4.5%	5.0%	4.5%	4.3%	5.1%	5.0%
Latin America	1.2%	1.2%	1.6%	1.9%	1.9%	1.4%	1.2%	1.4%	1.5%
Rest of World	0.3%	0.3%	0.2%	0.2%	0.2%	0.3%	0.2%	0.4%	0.5%
Imports:									
United States	7.7%	7.9%	9.0%	10.5%	10.6%	9.2%	8.2%	8.2%	8.4%
Canada	2.8%	2.7%	3.3%	3.4%	3.1%	2.8%	2.6%	2.7%	2.8%
Japan	4.9%	5.4%	5.6%	6.0%	5.6%	5.6%	5.6%	5.7%	5.8%
EC	43.5%	44.2%	43.7%	42.5%	43.4%	46.3%	47.5%	45.3%	46.0%
From External	12.5%	12.4%	12.4%	12.1%	12.4%	12.8%	12.9%	12.3%	12.7%
West Germany	9.7%	10.0%	10.0%	9.7%	9.9%	10.5%	10.6%	9.8%	9.8%
France	8.2%	8.0%	7.7%	7.4%	7.6%	8.1%	8.3%	7.9%	8.0%
Italy	5.6%	5.8%	5.9%	5.8%	6.0%	6.5%	6.7%	6.5%	6.6%
United Kingdom	5.8%	6.1%	6.2%	6.3%	6.2%	6.4%	6.7%	6.7%	6.6%
Other Western Europe	8.8%	9.1%	9.0%	8.3%	9.5%	9.9%	10.1%	9.8%	8.9%
Asian NICs	4.3%	4.6%	4.9%	5.1%	4.6%	5.3%	5.8%	8.4%	9.0%
EE - U.S.S.R	4.0%	3.7%	3.3%	3.1%	3.3%	3.1%	3.1%	2.9%	2.7%
Developing Countries	22.6%	21.0%	19.8%	19.3%	18.1%	16.2%	15.4%	15.1%	14.2%
Latin America	7.0%	6.3%	5.4%	5.6%	5.3%	5.0%	4.5%	4.1%	4.2%
Rest of World	0.2%	0.3%	0.3%	0.4%	0.4%	0.4%	0.3%	1.4%	1.1%

Source: CMA World Manufactures Trade Database

TABLE 10.6
1981 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 5 CHEMICALS AND RELATED PRODUCTS

				EXPORTER						
Importer	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer
World	123.5	23.0	4.0	6.7	72.7	22.0	12.1	10.8	0.8	1.4
United States	8.7		2.4	1.0	3.4	1.1	0.6	0.6	0.2	0.7
Canada	3.3	2.6		0.1	0.5	0.1	0.1	0.1	0.0	0.0
Japan	5.5	2.4	0.2		1.5	0.6	0.3	0.2	0.4	0.2
EC	56.3	5.6	0.8	0.7	40.5	11.3	6.7	5.4	0.1	0.5
West Germany	11.2	0.9	0.1	0.2	7.8		2.0	0.9	0.0	0.1
France	9.3	0.7	0.2	0.1	6.4	2.4		0.8	0.0	0.1
United Kingdom	6.6	0.7	0.1	0.1	4.7	1.4	1.1		0.0	0.1
NICs	5.5	2.0	0.1	1.8	1.3	0.4	0.2	0.3	0.0	0.0
Latin America	8.8	4.9	0.2	0.2	2.9	1.0	0.5	0.4	0.0	
Other	35.4	5.5	0.4	2.9	22.7	7.3	3.8	3.7	0.1	0.1

Source: CMA World Manufactures Trade Database

TABLE 10.7
1989 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 5 CHEMICALS AND RELATED PRODUCTS

				EXPORTER						
Importer	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer
World	246.8	36.4	6.5	14.6	144.1	43.9	24.0	20.2	6.1	3.6
United States	20.9		4.1	2.5	8.8	2.7	1.4	1.8	0.8	1.8
Canada	5.9	4.2		0.1	1.1	0.4	0.1	0.3	0.1	0.1
Japan	13.7	4.7	0.3		4.1	1.8	0.7	0.6	1.3	0.3
EC	116.2	9.7	0.7	2.4	83.6	23.4	14.3	10.7	0.5	1.0
West Germany	23.3	1.5	0.0	0.7	15.9		3.8	2.3	0.1	0.2
France	19.4	0.9	0.2	0.3	14.4	5.2		2.1	0.0	0.2
United Kingdom	15.4	1.5	0.2	0.3	10.9	3.4	2.4		0.1	0.1
NICs	18.4	4.7	0.4	5.2	3.8	1.4	0.6	0.7	1.7	0.3
Latin America	10.8	5.9	0.2	0.3	3.6	1.2	0.8	0.5	0.1	
Other	61.0	7.2	0.8	4.1	39.1	13.1	6.2	5.6	1.6	0.1

Source: CMA World Manufactures Trade Database

TABLE 10.8
COUNTRY SHARES OF WORLD CHEMICALS IMPORTS AND EXPORTS (%)
SITC 51 ORGANIC CHEMICALS

Country/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth 1981-89
Share of World Exports										
U.S.	16.3%	16.1%	14.0%	14.7%	14.0%	13.2%	13.3%	13.5%	16.0%	-0.3%
Canada	3.2%	3.1%	3.1%	2.9%	2.7%	2.0%	2.1%	2.3%	2.2%	-1.0%
Japan	6.9%	7.0%	6.7%	6.7%	6.8%	7.6%	8.1%	7.8%	8.2%	1.3%
EC	59.7%	59.0%	60.8%	59.7%	58.9%	59.1%	59.3%	57.1%	54.8%	-4.9%
To External	23.2%	23.2%	25.0%	25.0%	24.5%	24.3%	23.9%	23.3%	22.0%	-1.2%
West Germany	18.2%	18.9%	18.4%	18.0%	17.5%	18.2%	17.9%	16.7%	15.6%	-2.5%
France	9.1%	5.6%	8.8%	8.8%	8.8%	9.3%	9.5%	8.7%	8.5%	-0.7%
Italy	3.4%	4.6%	5.2%	5.1%	4.7%	4.0%	4.5%	3.9%	4.0%	0.6%
United Kingdom	9.2%	9.5%	9.0%	9.0%	9.6%	9.2%	9.3%	8.9%	8.3%	-0.9%
Other Western Europe	7.7%	8.4%	7.8%	7.2%	7.5%	8.6%	8.5%	8.1%	7.5%	-0.2%
Asian NICs	0.8%	0.8%	1.0%	1.5%	1.3%	1.4%	1.4%	2.1%	2.1%	1.4%
EE - U.S.S.R.	2.0%	1.9%	1.9%	1.9%	2.3%	2.1%	1.8%	2.3%	1.8%	-0.2%
Developing Countries	3.5%	3.6%	4.7%	5.4%	6.3%	5.7%	5.3%	6.4%	6.9%	3.4%
Latin America	1.8%	1.7%	2.8%	3.3%	3.4%	2.1%	1.7%	1.9%	2.4%	0.6%
Rest of World	0.1%	0.1%	0.2%	0.3%	0.3%	0.5%	0.4%	0.6%	0.7%	0.6%
Share of World Imports										
U.S.	9.1%	9.0%	10.6%	11.7%	12.0%	9.7%	8.8%	8.7%	10.4%	1.3%
Canada	2.5%	2.3%	2.7%	2.8%	2.7%	2.5%	2.3%	2.1%	2.1%	-0.4%
Japan	5.7%	5.7%	6.4%	6.6%	6.3%	6.7%	6.8%	7.0%	6.7%	1.0%
EC	50.0%	50.2%	47.4%	46.0%	46.4%	48.0%	48.5%	44.9%	45.4%	-4.6%
To External	13.2%	13.3%	12.5%	12.9%	13.2%	13.6%	13.2%	12.4%	13.1%	-0.1%
West Germany	11.3%	11.1%	10.7%	10.2%	10.5%	10.7%	10.8%	9.5%	10.0%	-1.4%
France	7.7%	7.9%	7.4%	7.1%	7.1%	7.4%	7.8%	7.0%	6.9%	-0.8%
Italy	6.4%	6.9%	6.5%	6.5%	6.9%	7.4%	7.1%	6.5%	6.8%	0.3%
United Kingdom	6.6%	6.7%	6.7%	6.9%	6.4%	6.3%	6.5%	6.3%	6.1%	-0.5%
Other Western Europe	7.5%	7.9%	7.3%	6.8%	8.0%	8.1%	8.0%	8.0%	6.9%	-0.6%
Asian NICs	5.1%	5.8%	6.2%	6.5%	6.1%	7.5%	8.5%	12.5%	13.0%	7.8%
EE - U.S.S.R.	3.5%	3.0%	2.8%	2.7%	2.8%	2.7%	2.8%	2.4%	2.3%	-1.2%
Developing Countries	15.7%	15.1%	15.6%	15.5%	14.5%	13.7%	13.1%	12.6%	11.7%	-4.0%
Latin America	6.9%	6.4%	5.7%	6.4%	6.0%	5.7%	5.2%	4.4%	4.4%	-2.5%
Rest of World	0.1%	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%	1.6%	0.9%	0.9%

Source: CMA World Manufactures Trade Database

TABLE 10.9
COUNTRY SHARES OF WORLD CHEMICAL IMPORTS AND EXPORTS (%)
SITC 52 INORGANIC CHEMICALS

Country/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth 1981-89
Share of World Exports										
U.S.	20.4%	20.6%	20.5%	22.7%	19.6%	16.9%	15.3%	15.0%	17.9%	-2.5%
Canada	7.3%	6.0%	6.0%	6.9%	6.5%	6.4%	5.9%	6.0%	7.4%	0.1%
Japan	4.2%	4.1%	4.3%	3.8%	3.7%	3.9%	4.3%	4.4%	4.6%	0.4%
EC	45.0%	47.8%	46.4%	44.5%	48.5%	51.4%	52.2%	50.2%	47.1%	2.2%
To External	22.8%	23.0%	23.8%	22.0%	23.6%	22.3%	22.6%	23.5%	21.5%	-1.3%
West Germany	12.6%	13.3%	12.9%	13.2%	12.4%	14.0%	14.6%	13.1%	13.8%	1.3%
France	12.0%	12.4%	11.0%	11.2%	14.0%	14.8%	15.2%	13.6%	10.9%	-1.1%
Italy	4.7%	5.1%	6.2%	3.5%	4.0%	2.7%	2.5%	2.4%	2.6%	-2.1%
United Kingdom	7.3%	8.1%	7.1%	6.8%	7.5%	9.0%	8.9%	8.3%	6.9%	-0.4%
Other Western Europe	4.7%	4.5%	4.9%	5.1%	5.4%	5.5%	6.0%	5.9%	5.6%	0.9%
Asian NICs	0.4%	0.6%	0.6%	0.7%	0.6%	0.7%	0.7%	1.2%	1.4%	1.1%
EE - U.S.S.R.	6.0%	4.6%	4.9%	4.8%	4.6%	4.2%	4.4%	4.9%	3.4%	-2.6%
Developing Countries	10.4%	10.3%	11.3%	11.4%	10.9%	10.6%	10.9%	11.8%	11.6%	1.2%
Latin America	2.7%	2.9%	3.1%	3.4%	2.8%	2.2%	2.0%	2.5%	3.2%	0.5%
Rest of World	1.5%	1.6%	1.0%	0.1%	0.2%	0.5%	0.5%	1.0%	1.1%	-0.4%
Share of World Imports										
U.S.	13.8%	15.4%	16.5%	19.7%	18.7%	17.1%	14.0%	14.4%	14.2%	0.5%
Canada	2.2%	2.0%	2.3%	2.3%	2.2%	2.0%	1.9%	2.3%	2.7%	0.5%
Japan	6.3%	8.4%	9.4%	11.2%	9.6%	8.9%	9.1%	9.4%	10.2%	3.9%
EC	44.1%	40.5%	39.7%	38.6%	40.8%	44.6%	45.8%	41.9%	41.1%	-2.9%
To External	20.7%	18.2%	19.1%	17.1%	17.1%	17.7%	19.2%	17.9%	17.0%	-3.7%
West Germany	10.3%	10.9%	10.5%	10.6%	10.9%	11.2%	11.1%	10.4%	9.4%	-0.9%
France	13.1%	9.3%	8.9%	8.8%	9.2%	10.3%	10.1%	9.4%	8.4%	-4.8%
Italy	4.6%	3.7%	4.6%	3.4%	3.3%	3.8%	4.1%	3.8%	4.2%	-0.4%
United Kingdom	5.8%	6.1%	5.6%	5.5%	6.5%	7.3%	7.6%	6.6%	6.8%	1.0%
Other Western Europe	7.0%	7.3%	7.4%	6.4%	9.1%	8.0%	8.6%	9.2%	7.4%	0.4%
Asian NICs	2.5%	3.7%	4.8%	4.3%	4.1%	5.2%	5.4%	6.6%	7.6%	5.1%
EE - U.S.S.R.	6.0%	5.4%	4.9%	4.3%	3.5%	2.7%	3.2%	3.1%	2.6%	-3.4%
Developing Countries	16.6%	15.6%	13.8%	12.0%	11.2%	10.3%	10.8%	11.7%	11.8%	-4.8%
Latin America	6.7%	6.3%	4.3%	3.8%	3.4%	3.2%	3.4%	3.6%	4.1%	-2.6%
Rest of World	0.1%	0.1%	0.0%	0.3%	0.3%	0.4%	0.0%	1.1%	1.2%	1.1%

Source: CMA World Manufactures Trade Database

TABLE 10.10
COUNTRY SHARES OF WORLD CHEMICAL IMPORTS AND EXPORTS (%)
SITC 58 PLASTIC MATERIALS

Country/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth 1981-89
Share of World Exports										
U.S.	15.2%	15.2%	14.4%	14.5%	11.4%	10.3%	10.4%	11.0%	13.4%	-1.8%
Canada	1.3%	1.4%	1.2%	1.4%	1.7%	1.8%	1.9%	2.5%	2.6%	1.3%
Japan	7.7%	7.5%	7.9%	8.4%	8.0%	8.0%	7.6%	7.1%	6.7%	-1.0%
EC	65.0%	64.8%	64.8%	63.4%	65.6%	66.6%	66.7%	64.7%	62.2%	-2.8%
To External	25.5%	25.1%	25.1%	24.8%	24.9%	23.3%	22.2%	21.4%	20.0%	-5.6%
West Germany	21.7%	21.4%	21.3%	20.8%	21.5%	22.7%	22.7%	21.6%	20.3%	-1.4%
France	9.1%	8.4%	8.9%	8.7%	8.8%	8.7%	8.9%	8.8%	8.2%	-0.9%
Italy	5.9%	6.1%	6.0%	6.1%	6.4%	6.4%	6.4%	6.2%	6.3%	0.4%
United Kingdom	6.4%	6.4%	5.8%	5.7%	6.1%	5.8%	5.7%	5.6%	5.5%	-0.9%
Other Western Europe	7.6%	7.3%	7.5%	7.4%	7.7%	8.0%	8.3%	8.5%	7.4%	-0.1%
Asian NICs	1.0%	1.5%	1.5%	1.8%	1.8%	2.0%	2.1%	3.0%	4.5%	3.4%
EE - U.S.S.R.	1.2%	1.3%	1.2%	1.1%	1.2%	1.0%	0.8%	1.0%	0.8%	-0.4%
Developing Countries	0.6%	0.7%	1.1%	1.6%	2.3%	2.3%	2.1%	2.3%	2.2%	1.6%
Latin America	0.1%	0.2%	0.5%	0.8%	0.8%	0.8%	0.7%	0.7%	0.8%	0.6%
Rest of World	0.1%	0.0%	0.1%	0.2%	0.2%	0.2%	0.2%	0.1%	0.2%	0.1%
Share of World Imports										
U.S.	3.1%	3.1%	4.3%	5.4%	5.6%	5.0%	4.3%	4.2%	5.7%	2.6%
Canada	3.4%	3.1%	3.9%	4.1%	4.0%	3.5%	3.2%	3.3%	3.5%	0.1%
Japan	2.5%	2.6%	2.5%	2.6%	2.5%	2.6%	2.4%	2.6%	2.6%	0.2%
EC	48.8%	49.4%	49.1%	48.5%	50.5%	53.5%	54.7%	53.7%	52.4%	3.6%
To External	9.6%	9.6%	9.6%	9.7%	10.3%	10.5%	10.3%	10.3%	10.5%	1.0%
West Germany	12.0%	12.1%	12.3%	11.9%	12.3%	13.1%	13.0%	12.6%	12.1%	0.1%
France	8.5%	8.6%	8.1%	7.8%	8.2%	8.9%	9.1%	8.7%	8.6%	0.2%
Italy	6.5%	6.8%	6.8%	7.2%	7.3%	7.8%	8.1%	7.8%	7.6%	1.1%
United Kingdom	6.9%	7.3%	7.7%	7.6%	7.8%	7.9%	8.5%	8.9%	8.1%	1.3%
Other Western Europe	11.4%	11.1%	10.8%	10.3%	11.2%	11.4%	11.4%	11.0%	9.9%	-1.4%
Asian NICs	4.4%	4.9%	5.5%	5.6%	4.7%	5.6%	6.6%	6.6%	8.7%	4.4%
EE - U.S.S.R.	4.1%	3.4%	3.2%	2.9%	3.1%	2.8%	3.0%	3.0%	2.8%	-1.3%
Developing Countries	20.8%	20.8%	19.3%	18.8%	16.9%	14.4%	13.3%	13.9%	12.6%	-8.2%
Latin America	5.6%	5.0%	4.4%	4.2%	3.9%	3.6%	3.2%	3.1%	3.5%	-2.1%
Rest of World	0.2%	0.3%	0.3%	0.3%	0.2%	0.1%	0.1%	0.8%	0.8%	0.6%

Source: CMA World Manufactures Trade Database

TABLE 10.11
COUNTRY SHARES OF WORLD CHEMICAL MPORTS AND EXPORTS (%)
SITC 52 INORGANIC CHEMICALS

Country/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth 1981-89
Share of World Exports										
U.S.	20.4%	20.6%	20.5%	22.7%	19.6%	16.9%	15.3%	15.0%	17.9%	-2.5%
Canada	7.3%	6.0%	6.0%	6.9%	6.5%	6.4%	5.9%	6.0%	7.4%	0.1%
Japan	4.2%	4.1%	4.3%	3.8%	3.7%	3.9%	4.3%	4.4%	4.6%	0.4%
EC	45.0%	47.8%	46.4%	44.5%	48.5%	51.4%	52.2%	50.2%	47.1%	2.2%
To External	22.8%	23.0%	23.8%	22.0%	23.6%	22.3%	22.6%	23.5%	21.5%	-1.3%
West Germany	12.6%	13.3%	12.9%	13.2%	12.4%	14.0%	14.6%	13.1%	13.8%	1.3%
France	12.0%	12.4%	11.0%	11.2%	14.0%	14.8%	15.2%	13.6%	10.9%	-1.1%
Italy	4.7%	5.1%	6.2%	3.5%	4.0%	2.7%	2.5%	2.4%	2.6%	-2.1%
United Kingdom	7.3%	8.1%	7.1%	6.8%	7.5%	9.0%	8.9%	8.3%	6.9%	-0.4%
Other Western Europe	4.7%	4.5%	4.9%	5.1%	5.4%	5.5%	6.0%	5.9%	5.6%	0.9%
Asian NICs	0.4%	0.6%	0.6%	0.7%	0.6%	0.7%	0.7%	1.2%	1.4%	1.1%
EE - U.S.S.R.	6.0%	4.6%	4.9%	4.8%	4.6%	4.2%	4.4%	4.9%	3.4%	-2.6%
Developing Countries	10.4%	10.3%	11.3%	11.4%	10.9%	10.6%	10.9%	11.8%	11.6%	1.2%
Latin America	2.7%	2.9%	3.1%	3.4%	2.8%	2.2%	2.0%	2.5%	3.2%	0.5%
Rest of World	1.5%	1.6%	1.0%	0.1%	0.2%	0.5%	0.5%	1.0%	1.1%	-0.4%
Share of World Imports										
U.S.	13.8%	15.4%	16.5%	19.7%	18.7%	17.1%	14.0%	14.4%	14.2%	0.5%
Canada	2.2%	2.0%	2.3%	2.3%	2.2%	2.0%	1.9%	2.3%	2.7%	0.5%
Japan	6.3%	8.4%	9.4%	11.2%	9.6%	8.9%	9.1%	9.4%	10.2%	3.9%
EC	44.1%	40.5%	39.7%	38.6%	40.8%	44.6%	45.8%	41.9%	41.1%	-2.9%
To External	20.7%	18.2%	19.1%	17.1%	17.1%	17.7%	19.2%	17.9%	17.0%	-3.7%
West Germany	10.3%	10.9%	10.5%	10.6%	10.9%	11.2%	11.1%	10.4%	9.4%	-0.9%
France	13.1%	9.3%	8.9%	8.8%	9.2%	10.3%	10.1%	9.4%	8.4%	-4.8%
Italy	4.6%	3.7%	4.6%	3.4%	3.3%	3.8%	4.1%	3.8%	4.2%	-0.4%
United Kingdom	5.8%	6.1%	5.6%	5.5%	6.5%	7.3%	7.6%	6.6%	6.8%	1.0%
Other Western Europe	7.0%	7.3%	7.4%	6.4%	9.1%	8.0%	8.6%	9.2%	7.4%	0.4%
Asian NICs	2.5%	3.7%	4.8%	4.3%	4.1%	5.2%	5.4%	6.6%	7.6%	5.1%
EE - U.S.S.R.	6.0%	5.4%	4.9%	4.3%	3.5%	2.7%	3.2%	3.1%	2.6%	-3.4%
Developing Countries	16.6%	15.6%	13.8%	12.0%	11.2%	10.3%	10.8%	11.7%	11.8%	-4.8%
Latin America	6.7%	6.3%	4.3%	3.8%	3.4%	3.2%	3.4%	3.6%	4.1%	-2.6%
Rest of World	0.1%	0.1%	0.0%	0.3%	0.3%	0.4%	0.0%	1.1%	1.2%	1.1%

Source: CMA World Manufactures Trade Database

TABLE 10.12
COUNTRY SHARES OF WORLD CHEMICAL IMPORTS AND EXPORTS (%)
SITC 59 CHEMICAL MATERIALS NES

Country/Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Growth 1981-89
Share of World Exports										
U.S.	32.2%	22.7%	21.7%	22.2%	20.1%	17.9%	16.7%	16.5%	15.7%	-16.5%
Canada	1.1%	1.4%	1.5%	1.4%	1.3%	1.5%	1.4%	0.8%	0.9%	-0.2%
Japan	3.9%	4.6%	5.3%	5.2%	5.1%	5.2%	5.5%	5.7%	5.7%	1.8%
EC	53.1%	59.9%	59.8%	58.9%	60.8%	63.4%	63.8%	63.3%	64.2%	11.1%
To External	25.5%	28.8%	29.4%	29.4%	30.4%	30.1%	29.2%	29.2%	29.5%	4.0%
West Germany	17.3%	19.3%	20.2%	19.8%	20.2%	22.5%	22.4%	21.3%	21.4%	4.1%
France	9.4%	9.9%	10.0%	9.8%	9.9%	10.2%	10.2%	9.9%	10.3%	0.8%
Italy	3.0%	3.5%	3.8%	3.8%	3.7%	3.7%	3.8%	3.8%	3.8%	0.7%
United Kingdom	9.4%	11.0%	10.3%	10.1%	10.9%	10.4%	10.8%	9.5%	9.5%	0.1%
Other Western Europe	5.6%	6.4%	6.6%	6.4%	6.8%	6.9%	7.5%	7.1%	6.9%	1.3%
Asian NICs	0.2%	0.6%	0.8%	0.9%	1.0%	0.9%	0.9%	1.4%	1.5%	1.4%
EE - U.S.S.R.	0.4%	0.4%	0.4%	0.4%	0.5%	0.5%	0.5%	0.7%	0.7%	0.3%
Developing Countries	2.4%	2.3%	2.4%	3.0%	3.2%	2.6%	2.6%	3.2%	3.2%	0.8%
Latin America	0.8%	0.8%	0.8%	1.2%	1.3%	0.9%	0.8%	1.0%	0.8%	0.1%
Rest of World	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.3%	0.3%	0.3%
Share of World Imports										
U.S.	5.2%	5.5%	5.5%	6.1%	6.8%	6.1%	6.2%	6.2%	5.7%	0.5%
Canada	3.8%	4.3%	4.6%	4.9%	4.5%	3.8%	3.3%	3.5%	3.9%	0.1%
Japan	4.9%	5.4%	5.3%	5.7%	5.5%	5.6%	5.4%	5.6%	5.9%	1.0%
EC	36.8%	40.9%	41.2%	40.4%	41.5%	44.5%	45.9%	44.5%	44.8%	8.0%
To External	9.4%	10.2%	10.0%	9.9%	10.5%	10.7%	11.4%	11.3%	11.5%	2.0%
West Germany	6.5%	7.1%	8.0%	8.0%	8.8%	9.5%	9.5%	8.8%	8.7%	2.3%
France	7.3%	8.1%	7.7%	7.5%	7.9%	8.6%	8.8%	8.8%	9.3%	2.0%
Italy	5.3%	5.9%	5.8%	5.7%	5.6%	6.2%	6.8%	6.5%	6.2%	0.9%
United Kingdom	5.3%	6.0%	5.9%	5.9%	5.9%	5.7%	6.0%	6.0%	6.0%	0.7%
Other Western Europe	7.2%	8.1%	8.2%	7.5%	8.5%	9.2%	9.4%	9.0%	8.5%	1.3%
Asian NICs	6.6%	4.5%	5.0%	5.3%	4.9%	5.2%	5.7%	7.2%	8.8%	2.2%
EE - U.S.S.R.	4.4%	4.8%	4.3%	4.3%	5.5%	4.9%	4.5%	3.6%	3.2%	-1.2%
Developing Countries	30.2%	25.4%	25.0%	23.9%	21.1%	19.5%	18.9%	16.8%	15.5%	-14.7%
Latin America	8.6%	8.0%	7.5%	7.5%	6.8%	6.4%	5.8%	4.8%	4.5%	-4.2%
Rest of World	0.2%	0.3%	0.3%	0.7%	0.6%	0.5%	0.3%	2.9%	2.8%	2.6%

-Source: CMA World Manufactures Trade Database

TABLE 10.13
1981 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 51 ORGANIC CHEMICALS

		EXPORTER								
Importer	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
World	31.7	5.2	1.0	2.2	19.1	5.8	2.9	2.9	0.2	0.5	3.5
US	2.7	-	0.5	0.4	1.3	0.4	0.2	0.2	0.0	0.2	0.3
Canada	0.8	0.5		0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Japan	1.7	0.6	0.1		0.4	0.2	0.1	0.1	0.1	0.1	0.3
EC	16.2	1.5	0.3	0.3	11.9	3.2	1.9	1.9	0.0	0.2	2.0
W Germ	3.1	0.1	0.0	0.1	2.4		0.6	0.3	0.0	0.0	0.5
France	2.0	0.1	0.0	0.0	1.5	0.5		0.2	0.0	0.0	0.4
U.K.	1.8	0.1	0.0	0.0	1.3	0.4	0.3		0.0	0.0	0.2
NICs	1.7	0.6	0.0	0.7	0.4	0.1	0.0	0.1	0.0	0.0	0.0
L Amer	2.3	1.2	0.0	0.1	0.7	0.3	0.1	0.1	0.0		0.2
Other	6.4	0.7	0.0	0.7	4.2	1.6	0.6	0.5	0.0	0.0	

Source: CMA World Manufactures Trade Database

TABLE 10.14
1989 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 51 ORGANIC CHEMICALS

		EXPORTER								
Importer	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
World	66.4	10.6	1.4	5.4	36.4	10.4	5.6	5.5	1.4	1.6	9.6
US	6.9		0.8	1.0	3.2	1.0	0.4	0.6	0.3	0.8	0.9
Canada	1.4	0.9		0.0	0.3	0.1	0.0	0.1	0.0	0.0	0.1
Japan	4.2	1.2	0.2		1.3	0.4	0.1	0.2	0.4	0.1	1.1
EC	31.3	3.0	0.2	1.0	21.7	5.6	3.6	3.3	0.2	0.4	4.7
W Germ	5.9	0.4	0.0	0.3	4.1		0.9	0.7	0.1	0.1	1.0
France	4.2	0.1	0.0	0.1	3.0	1.0		0.6	0.0	0.1	0.8
U.K.	3.6	0.4	0.0	0.1	2.4	0.7	0.5		0.0	0.0	0.7
NICs	6.8	2.2	0.2	1.9	1.0	0.3	0.1	0.2	0.2	0.3	1.1
L Amer	3.1	1.7	0.0	0.1	1.0	0.4	0.2	0.1	0.0		0.3
Other	12.6	1.7	0.1	1.4	7.8	2.6	1.1	1.0	0.3	0.1	1.4

Source: CMA World Manufactures Trade Database

TABLE 10.15
1981 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 52 INORGANIC CHEMICALS

				EXPORTER							
	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
Importer											
World	15.7	3.2	1.1	0.7	7.2	2.0	1.9	1.1	0.1	0.4	2.9
US	1.9		0.7	0.1	0.5	0.2	0.2	0.1	0.0	0.3	0.3
Canada	0.4	0.3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Japan	1.0	0.5	0.0		0.2	0.1	0.1	0.0	0.0	0.0	0.1
EC	7.1	0.9	0.3	0.1	3.7	1.0	1.0	0.6	0.0	0.1	2.0
W Germ	1.4	0.3	0.0	0.0	0.6		0.2	0.1	0.0	0.0	0.4
France	1.8	0.2	0.2	0.0	0.5	0.2		0.1	0.0	0.0	0.9
U.K.	1.0	0.1	0.1	0.0	0.6	0.1	0.3		0.0	0.0	0.1
NICs	0.4	0.1	0.0	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.0
L Amer	1.1	0.7	0.0	0.0	0.4	0.1	0.0	0.0	0.0		0.0
Other	3.8	0.7	0.1	0.3	2.3	0.6	0.6	0.3	0.0	0.0	

Source: CMA World Manufactures Trade Database

TABLE 10.16
1989 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 52 INORGANIC CHEMICALS

				EXPORTER							
	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
Importer											
World	24.1	4.3	1.8	1.1	11.4	3.3	2.6	1.7	0.3	0.8	4.4
US	3.4		1.3	0.2	1.0	0.3	0.2	0.2	0.0	0.5	0.4
Canada	0.7	0.5		0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
Japan	2.4	1.1	0.1		0.4	0.1	0.2	0.1	0.1	0.1	0.5
EC	10.2	0.9	0.3	0.2	6.2	1.6	1.5	0.9	0.0	0.2	2.4
W Germ	2.1	0.3	0.0	0.0	1.3		0.3	0.3	0.0	0.0	0.5
France	2.1	0.1	0.1	0.0	1.0	0.4		0.1	0.0	0.0	0.8
U.K.	1.5	0.2	0.1	0.0	0.9	0.3	0.3		0.0	0.0	0.2
NICs	1.6	0.4	0.0	0.4	0.4	0.2	0.0	0.1	0.1	0.0	0.3
L Amer	1.0	0.7	0.0	0.0	0.3	0.1	0.0	0.0	0.0		0.0
Other	4.9	0.6	0.0	0.4	3.0	0.9	0.6	0.4	0.1	0.0	0.7

Source: CMA World Trade Manufactures Database

TABLE 10.17
1981 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 54 MEDICINAL, PHARMACEUTICAL PRODUCTS

			EXPORTER								
Importer	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
World	13.3	2.3	0.2	0.3	8.1	2.1	1.4	1.7	0.1	0.2	2.2
US	0.7		0.0	0.1	0.3	0.1	0.0	0.1	0.0	0.1	0.1
Canada	0.3	0.2		0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Japan	1.1	0.4	0.0		0.4	0.2	0.0	0.1	0.1	0.0	0.2
EC	5.5	0.9	0.0	0.1	3.4	0.8	0.5	0.6	0.0	0.1	1.0
W Germ	1.1	0.1	0.0	0.0	0.6		0.2	0.1	0.0	0.0	0.3
France	0.8	0.2	0.0	0.0	0.4	0.1		0.1	0.0	0.0	0.2
U.K.	0.6	0.1	0.0	0.0	0.3	0.1	0.1		0.0	0.0	0.1
NICs	0.3	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1
L Amer	0.9	0.3	0.0	0.0	0.4	0.2	0.1	0.1	0.0		0.1
Other	4.6	0.4	0.1	0.1	3.3	0.8	0.7	0.8	0.0	0.0	

Source: CMA World Manufactures Trade Database

TABLE 10.18
1989 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 54 MEDICINAL, PHARMACEUTICAL PRODUCTS

			EXPORTER								
Importer	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
World	27.2	3.6	0.2	0.8	16.6	4.5	2.9	3.2	0.2	0.2	5.7
US	2.0		0.1	0.2	1.1	0.3	0.1	0.4	0.0	0.0	0.5
Canada	0.6	0.3		0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.1
Japan	2.5	0.8	0.0		1.1	0.6	0.1	0.2	0.1	0.0	0.5
EC	12.0	1.5	0.0	0.3	7.3	1.8	1.2	1.3	0.0	2.8	
W Germ	2.4	0.3	0.0	0.1	1.1		0.3	0.2	0.0	0.0	0.8
France	1.8	0.2	0.0	0.1	1.1	0.3		0.3	0.0	0.0	0.4
U.K.	1.6	0.2	0.0	0.0	1.0	0.3	0.2		0.0	0.0	0.3
NICs	0.8	0.1	0.0	0.1	0.3	0.1	0.0	0.1	0.0	0.0	0.1
L Amer	1.1	0.3	0.0	0.0	0.6	0.2	0.2	0.1	0.0		0.2
Other	8.3	0.6	0.0	0.1	6.0	1.5	1.4	1.0	0.1	0.0	1.5

Source: CMA World Manufactures Trade Database

TABLE 10.19
1981 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 58 PLASTIC MATERIALS ETC

		EXPORTER								
Importer	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
World	24.7	3.8	0.3	1.9	16.6	5.4	2.2	1.6	0.3	0.0	1.9
US	0.9		0.2	0.2	0.4	0.2	0.1	0.1	0.1	0.0	0.0
Canada	0.7	0.6		0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Japan	0.5	0.3	0.0		0.1	0.1	0.0	0.0	0.1	0.0	0.0
EC	12.6	0.8	0.0	0.1	10.5	3.1	1.5	0.8	0.0	0.0	1.2
W Germ	2.9	0.1	0.0	0.0	2.3		0.5	0.1	0.0	0.0	0.4
France	2.0	0.1	0.0	0.0	1.8	0.7		0.1	0.0	0.0	0.1
U.K.	1.6	0.2	0.0	0.0	1.3	0.4	0.2		0.0	0.0	0.1
NICs	1.1	0.3	0.0	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0
L Amer	1.4	0.9	0.0	0.1	0.4	0.2	0.1	0.0	0.0		0.0
Other	7.4	0.8	0.1	1.0	4.9	1.8	0.5	0.6	0.0	0.0	

Source: CMA World Manufactures Trade Database

TABLE 10.20
1989 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 58 PLASTIC MATERIALS ETC

		EXPORTER								
Importer	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
World	59.4	8.0	1.5	4.0	37.0	12.1	4.9	3.2	2.6	0.5	5.9
US	3.5		0.9	0.7	1.1	0.4	0.1	0.2	0.4	0.2	0.2
Canada	1.5	1.2		0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0
Japan	1.6	0.6	0.0		0.3	0.2	0.1	0.0	0.5	0.0	0.1
EC	31.5	2.0	0.1	0.5	25.1	7.4	3.6	1.9	0.1	0.2	3.6
W Germ	7.2	0.3	0.0	0.2	5.4		1.1	0.4	0.0	0.0	1.2
France	5.2	0.1	0.0	0.0	4.5	1.7		0.4	0.0	0.0	0.5
U.K.	4.7	0.4	0.0	0.1	3.7	1.2	0.6		0.0	0.0	0.5
NICs	4.7	1.2	0.1	1.5	0.6	0.3	0.1	0.1	1.1	0.0	0.2
L Amer	2.1	1.6	0.1	0.0	0.4	0.2	0.1	0.0	0.0		0.0
Other	14.5	1.4	0.4	1.2	9.1	3.6	0.9	0.9	0.6	0.0	1.8

Source: CMA World Manufactures Trade Database

TABLE 10.21
1981 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 59 CHEMICAL MATERIALS NES

		EXPORTER								
Importer	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
World	16.4	5.3	0.2	0.6	8.9	2.8	1.5	1.5	0.0	0.1	1.3
US	0.8		0.1	0.1	0.4	0.1	0.0	0.1	0.0	0.1	0.2
Canada	0.6	0.6		0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Japan	0.7	0.3	0.0		0.1	0.1	0.0	0.0	0.0	0.0	0.2
EC	6.2	0.8	0.0	0.1	4.8	1.6	0.8	0.6	0.0	0.0	0.4
W Germ	1.0	0.1	0.0	0.0	0.8		0.2	0.1	0.0	0.0	0.1
France	1.2	0.1	0.0	0.0	1.0	0.5		0.1	0.0	0.0	0.1
U.K.	0.8	0.1	0.0	0.0	0.6	0.2	0.1		0.0	0.0	0.1
NICs	1.1	0.8	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
L Amer	1.4	0.9	0.0	0.0	0.4	0.1	0.1	0.1	0.0		0.1
Other	5.5	1.8	0.0	0.2	3.0	0.9	0.5	0.6	0.0	0.0	

Source: CMA World Manufactures Trade Database

TABLE 10.22
1989 WORLD CHEMICALS TRADE FLOWS (BILLION DOLLARS)
SITC 59 CHEMICAL MATERIALS NES

		EXPORTER								
Importer	World	US	Can.	Japan	EC	W Germ	France	U.K.	NICs	L Amer	Other
World	28.4	4.4	0.3	1.6	18.2	6.1	2.9	2.7	0.4	0.2	3.2
US	2.0		0.2	0.3	1.1	0.3	0.2	0.2	0.0	0.1	0.3
Canada	0.8	0.7		0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Japan	1.5	0.5	0.0		0.4	0.2	0.1	0.1	0.1	0.0	0.4
EC	13.0	1.2	0.0	0.3	9.8	3.3	1.7	1.4	0.0	0.1	1.5
W Germ	2.4	0.1	0.0	0.1	1.7		0.4	0.3	0.0	0.0	0.5
France	2.5	0.2	0.0	0.0	2.0	1.0		0.3	0.0	0.0	0.3
U.K.	1.7	0.2	0.0	0.0	1.2	0.5	0.3		0.0	0.0	0.2
NICs	1.8	0.4	0.0	0.5	0.5	0.2	0.1	0.1	0.1	0.0	0.2
L Amer	1.4	0.8	0.0	0.0	0.5	0.2	0.1	0.1	0.0		0.1
Other	8.0	0.8	0.0	0.5	5.7	1.9	0.8	0.8	0.1	0.0	0.8

Source: CMA World Manufactures Trade Database

Definition of the Chemical Industry

There is no single definition of the chemical industry for statistical purposes. Data in this handbook are cited in the basis on which they were published. To the greatest extent possible, data herein cover Chemicals and Allied Products (SIC 28) on an industry basis. According to the *Standard Industrial Classification Manual*, SIC 28 includes both establishments producing basic chemicals and establishments manufacturing products by predominantly chemical processes. Establishments classified in this major group manufacture three general classes of products: (1) basic chemicals, such as acids, alkalies, salts, and organic chemicals; (2) chemical products to be used in further manufacture, such as synthetic fibers, plastic materials, dry colors, and pigments; and (3) finished chemical products to be used for ultimate consumption, such as drugs, cosmetics, and soaps; or to be used as materials or supplies in other industries, such as paints fertilizers, and explosives.

Data on R&D funding, new plant & equipment expenditures, and finances of the industry, however, are reported on a company basis which differs in concept from data reported on an industry basis. Data reported on a company basis may not include non-chemicals business activities by companies classified as chemical companies. For example, the new plant and equipment expenditure data collected by the Bureau of the Census will include investments by chemical companies for non-chemical assets. This data may overstate capital investment by the chemical industry. For this reason, the gross investment data developed by the Bureau of Economic Analysis may be preferable in that it includes investments for chemical assets by both chemical and non-chemical companies.

CMA
CHEMICAL MANUFACTURERS ASSOCIATION
2501 M Street, NW
Washington, DC 20037
202-887-1100
Fax 202-887-1237
Telex 89617 (CMA WSH)

printed on recycled paper